

MACHINE TOOL BLUE BOOK



Source of Supply for
Style "S" Sure Grip
Master Collets and Pads



HARDINGE Precision Collets and Feed Fingers for all
makes of Automatics, Turret Lathes and Chucking Machines



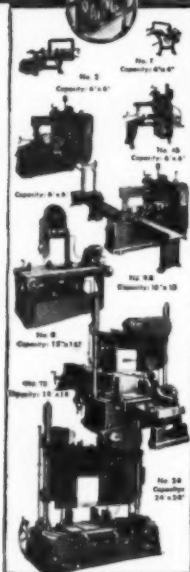
Source of Supply for
Style "B" Master
Feed Fingers and Pads



Source of Supply for
Conventional Style
Collets and Feed Fingers



"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"



The MARVEL No. 8 does this job with ease — fast and economically

The Denver Shops of the Denver Rio Grande and Western Railroad, like numerous other railroad shops, have found the No. 8 MARVEL Universal Metal Cutting Band Saw Machine the ideal metal sawing machine. The illustration shows the cutting of floating rod bushings into three equal sections. Normally a difficult and expensive operation, this job is done on a No. 8 MARVEL Band Saw with ease, speedily and economically. No special tools, jigs, or high mechanical skill are required.

In railroad shops, as in many machine shops, tool rooms, and fabricating shops, there is a real need for a UNIVERSAL metal sawing machine that will cut the smallest, most delicate pieces as well as solid blocks 18" x 18". The No. 8 MARVEL Band Saw Machine answers these requirements and in addition will mitre, trim, notch and make re-entrant cuts.

The No. 8 MARVEL Metal Band Sawing Machine is but one machine in the MARVEL system. There is a MARVEL Metal Cutting Saw (either hack saw or band saw) for every shop's need. A local service engineer is available to survey your work without cost or obligation. He will recommend the best saw for your work, supplying accurate cost and production data. Write us asking for a call by a MARVEL sawing expert. A complete catalog is also available.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 W. Bloomingdale Ave., Chicago 39, U. S. A.
Eastern Sales Office: 225 Lafayette St., New York 12, N. Y.

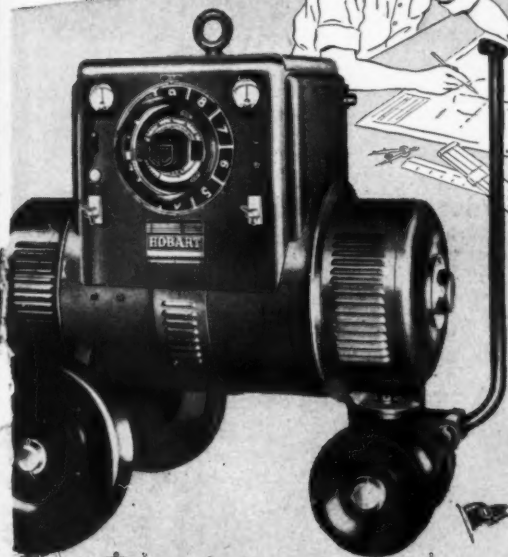
MARVEL SAWS

Be Ready for the Reconversion "GO-SIGN" with...

HOBART "Simplified" ARC WELDERS



... and Their Exclusive Advantages of Time and Labor Saving.



The trend is toward welded design because of the innumerable facts that have been accomplished with arc welding . . . increased ship production . . . increased tank production . . . increased gun production . . . and increased production of thousands of other pieces of equipment that bring "VICTORY" closer. Plan now for the largest reconversion JOB the world has ever known! Get ready for the light to change! Let WELDED DESIGN be your first gear . . . let Hobart "SIMPLIFIED" Arc Welders be your second gear . . . and your third gear will be smooth flowing production of stronger, lighter, better looking products at the lowest possible cost.

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"One of the World's Largest Builders of Arc Welders"

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CONTAINS TABLES, CHARTS, DECIMAL EQUIVALENTS, ETC.



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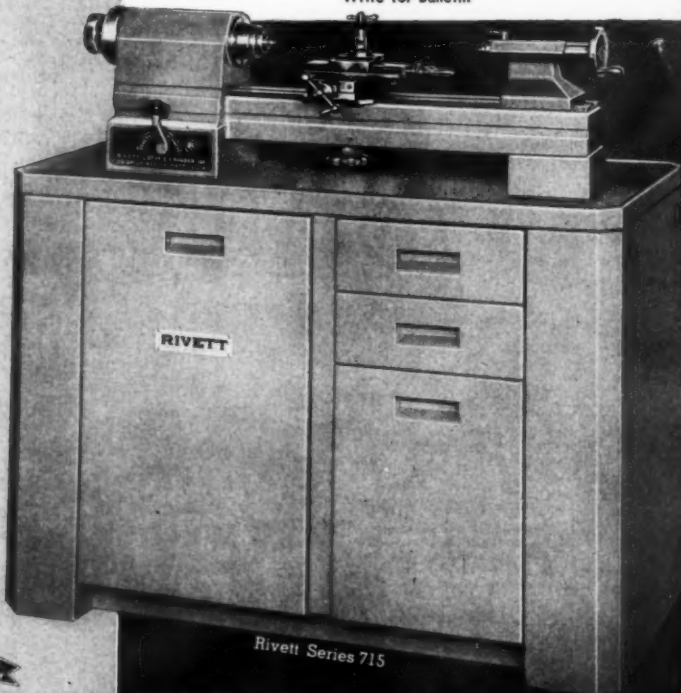
RIVETT

PLAIN BENCH LATHES FOR FINE FINISHING

The well equipped lathe department finds the modern Rivett plain bench lathe indispensable for fine finishing operations. The Rivett balanced design, power and speed range have brought the bench lathe and its precision out of the tool-room into production. Many operations formerly done on heavy, costly machines are now being properly routed to bench lathes.

Selection can be made from two sizes of Rivett plain bench lathes complete with their mountings, drives and attachments. Series 918 has 9" swing, 18" center distance and 1" collet capacity. Series 715 has 7" swing, 15" center distance and $\frac{3}{4}$ " collet capacity.

Write for Bulletin



Rivett Series 715



RIVETT LATHE & GRINDER INC.

BRIGHTON BOSTON MASS U.S.A.



Making precision threaded bushings.



Turning angle face of generator rings to length.



Facing retaining rings.



at

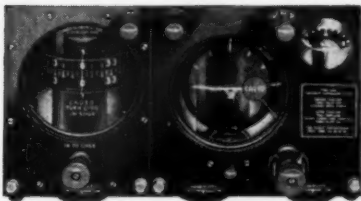
JACK & HEINTZ, Inc.

Since 1917 Bill Jack has been heading companies which manufactured precision parts, so it was only natural that Hardinge lathes were selected for precision operation at Jack & Heintz, Inc. of Cleveland.

Jahco now manufactures automatic pilots, flight instruments, engine starters, generators and other aircraft units requiring high precision tolerances customarily being inspected to a few ten-thousandths. Some parts of these instruments are more delicate than a watch yet Jahco makes them on a volume production basis.

Hardinge precision lathes have played their part in permitting such accuracy with the necessary speed to meet high production schedules. No plane has ever been held on the ground for lack of a promised Jahco unit. No less than twenty Jahco units are made for the new Boeing B-29 Superfortresses.

HARDINGE BROTHERS, INC.
ELMIRA, N. Y.

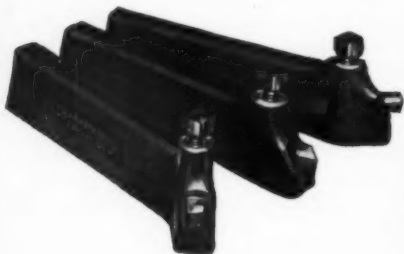


Jahco automatic pilot which keeps the plane level and on the course set.

ARMSTRONG

The "Armstrong System" provides Carbide cutting tools for everyday operations

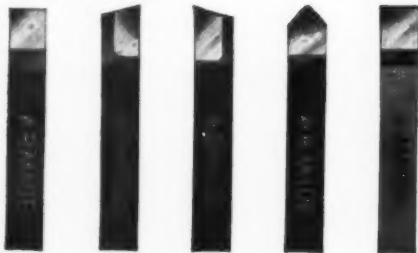
The wide use of carbide-tipped cutting tools for greater war production has changed standard cutting speeds and feeds. Carbide tools cut the hardest and toughest steels, sand-filled castings and many heretofore unmachinable substances without appreciable loss of edge . . . lengthen the interval between tool regrinding from 10 to 100 times on long runs.



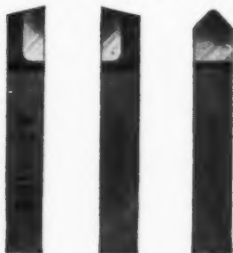
The "Armstrong System" provides the "carbide" tools for everyday operations in tool rooms and machine shops: standard ARMSTRONG Carbide TOOL HOLDERS and ARMIDE Carbide-Tipped Cutters, ground to standard cutting shapes, for use in these tool holders. ARMSTRONG Carbide TOOL HOLDERS come with "Straight", "Right-Hand Off-Set" or "Left-Hand Off-Set" shanks, each in 7 sizes. ARMIDE Carbide-Tipped Cutters come in two grades: ARMIDE Red for cutting steel; ARMIDE Gray for machining cast iron, brass, bronze, aluminum and non-metals. ARMIDE cutters are ready ground in the four shapes illustrated. ARMSTRONG Carbide TOOL HOLDERS and ARMIDE Cutters are stocked by industrial suppliers, and are sold singly or in matched sets in a fitted steel case.



ARMIDE RED CUTTERS



ARMIDE GRAY CUTTERS



ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

308 N. Francisco Ave.

Eastern Whse. and Sales: 199 Lafayette St., N. Y. 12, N. Y.
Western Whse. and Sales: 1275 Mission St., San Francisco, Calif.

Chicago 12, U. S. A.

Machine Tool Blue Book

Hitchcock Publishing Co., 542 So. Dearborn St., Chicago 5

Published Monthly

Volume 40, No. 12

DECEMBER 1944

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Gauge Growth Eliminated after

Cold Treating

IN A **Deepfreeze** INDUSTRIAL

**CHILLING
MACHINE**



**In Addition, Gauge
Life Lengthened as a Result of Increased Metal**

Hardness Here is a typical example of how manufacturers are using cold treating to stabilize gauges and other precision machine parts. Under conventional production methods these "H" type pin gauges grew as much as .001" to .0015" while stored in tool cribs. To remedy this, gauges were subjected to the following procedure in a Deepfreeze -120° F. Industrial Chilling Machine:

(1) Heat to 1450° F.; (2) water quenched; (3) immersed in water approximately 210° F. for 1½ hours; (4) return to room temperature; (5) transfer to Deepfreeze at -120° F. for 1½ hours; (6) return to room temperature; (7) given a draw of 375° F. for 1½ hours; (8) cooled to room temperature; (9) return to Deepfreeze for 1½ hours; (10) return to room temperature;

(11) immersed in hot water at 210° F. for 1½ hours; (12) return to room temperature; (13) again cold treated in Deepfreeze at -120° F. for 1½ hours; (14) return to room temperature; (15) finished ground to size.

Gauges were checked for size immediately after cold treatment, two months later, and again four months later. Results—growth held to .00004" as compared to former .0015". Metal hardness was also improved as a result of this treatment.

FREE . . . LATEST COLD TREATING INFORMATION . . .

Get the complete history of cold treating in this new 40-page booklet. Learn how leading manufacturers are applying it to their production. Write for Bulletin No. 1-4.

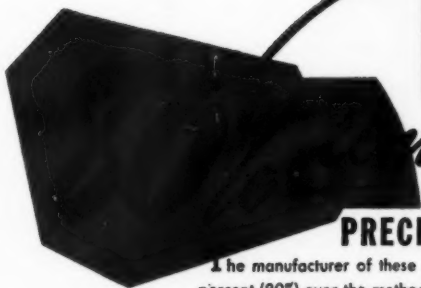
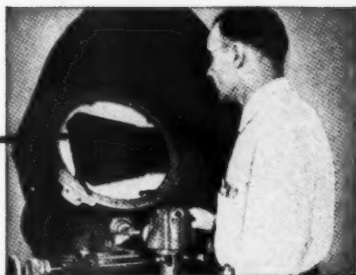
Deepfreeze

Only Motor Products can make a "Deepfreeze"

2319 DAVIS STREET
NORTH CHICAGO, ILLINOIS

TRADE MARK DEEPFREEZE REGISTERED UNITED STATES PATENT OFFICE
Industrial Chilling Equipment for Shrinking, Testing, Hardening and Stabilizing Metals

Division of Motor Products Corporation, Detroit, Michigan



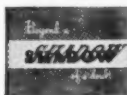
Time saved... INSPECTING HIGH PRECISION COLLET HOLDERS

The manufacturer of these collet holders reports "a time saving of eighty percent (80%) over the method formerly used - - -", when a Jones & Lamson Pedestal Optical Comparator was installed. The angles are held to limits of ± 15 minutes of arc, and the straight diameter to $\pm .001$ ".

Through a highly precise lens system, a magnified shadow of the part is projected upon the screen of the Comparator and compared with a master outline drawn upon the glass. It's as simple as that, and the results are accurate beyond a shadow of a doubt.

Form tools, gages and other products with complex or multiform contours can be checked and measured in all dimensions by means of the standard measuring attachments of Jones & Lamson Optical Comparators.

For the method best suited to your own needs, consult a Jones & Lamson inspection engineer. There is one near you, and he is backed by an organization with over 20 years experience in the optical inspection field.



This book "Beyond a Shadow of a Doubt" will tell you more about our Optical Comparators and what they are doing.



JONES & LAMSON
MACHINE COMPANY
Springfield, Vermont, U.S.A.



Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

IT HAS TO BE

TO GRIND



CINCINNATI No. 2 Centerless Grinding Machine. Catalog G-456-2 contains complete specifications. For a brief description of the Centerless Machines, look in Sweet's Catalog File for Mechanical Industries.



You can't afford to spend a lot of time or money machining plastics, and that's why CINCINNATI Centerless Grinders fit so well in the production of such parts. These machines are used extensively for grinding operations on plastic pool balls, electrical insulators, bowling balls, poker chips and tubes and rods of various diameters and lengths. Stock removal may vary anywhere from a fine finish of a few thousandths to a rough grind of rounding up square bars. ¶ The centerless method is ideal for grinding a wide range of parts made from all types of metallic and nonmetallic materials. Cincinnati Application Engineers offer you the benefit of their 20 years of experience in improving centerless grinding procedure.

THE CINCINNATI MILLING MACHINE CO.

COOL ROOM AND MANUFACTURING MILLING MACHINES...SURFACE BROACHING MACHINES...CUTTER SHARPENING

FAST *PLASTICS*



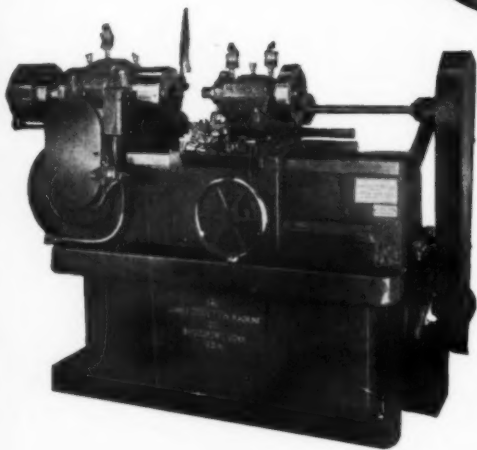
Grinding plastic tubes on a
CINCINNATI No. 2 Centerless
Grinder. Stock removal .050" to
.075", at a production rate of
well over 100" per minute.

CINCINNATI GRINDERS INCORPORATED CINCINNATI, OHIO, U.S.A.

MACHINES... CENTERTYPE GRINDING MACHINES... CENTERLESS GRINDING MACHINES... CENTERLESS LAPPING MACHINES

THE COULTER

HOB THREAD MILLER



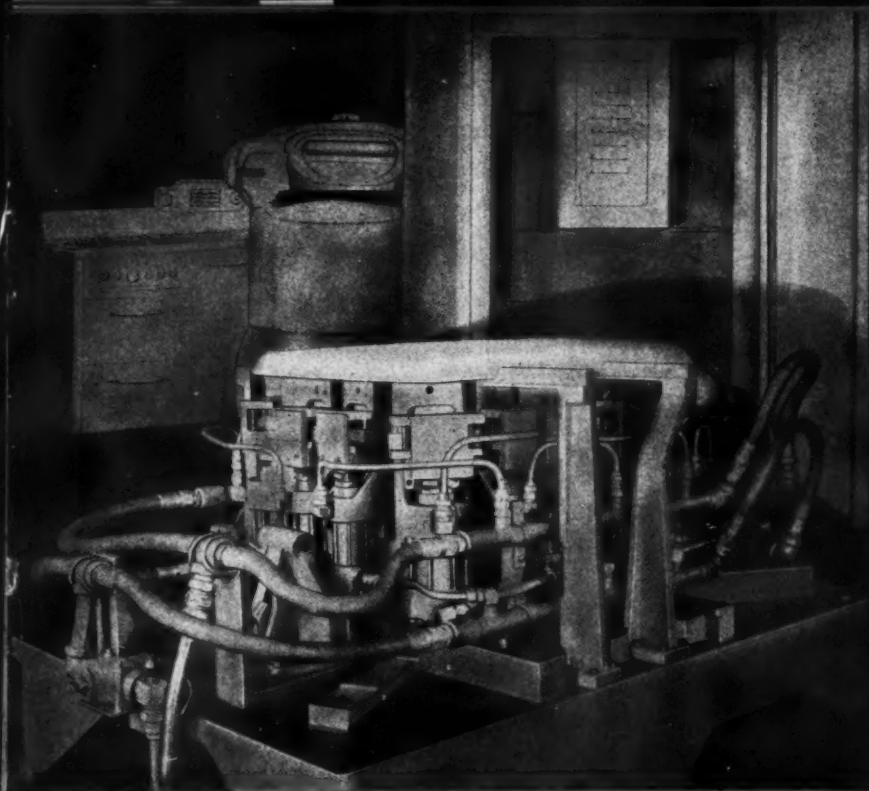
FOR THE RAPID
DUPLICATION OF
RIGHT OR LEFT
HAND THREADS
—INTERNAL OR
EXTERNAL

Any parts that can be held in ordinary chucks, air operated chucks, air operated collet chucks, or special face plate fixtures . . . can be threaded on this machine.

Set cam-controlled automatic cycle on first piece. Thereafter, cutter feeds into work to proper depth and at correct pitch and withdraws when cut is completed. Work and cutter spindles are driven by individual motors through worm drive, affording ample power throughout the wide range of speeds and feeds.

Write for Details and Specifications.

The James **COULTER** *Machine Co.*
BRIDGEPORT • CONNECTICUT • U. S. A.



BUY U. S.
WAR BONDS

WRITE US
FOR
CATALOG
SHOWING
HYDRO-PIERCE
APPLICATIONS

"PIERCE-FORM WITHOUT A PRESS"

Thinking about Postwar Competition? Let Mid-West Hydro-Pierce Engineers help you. Above you will see our method as applied to precision piercing of household appliances.

MID WEST HYDRO PIERCE INC.

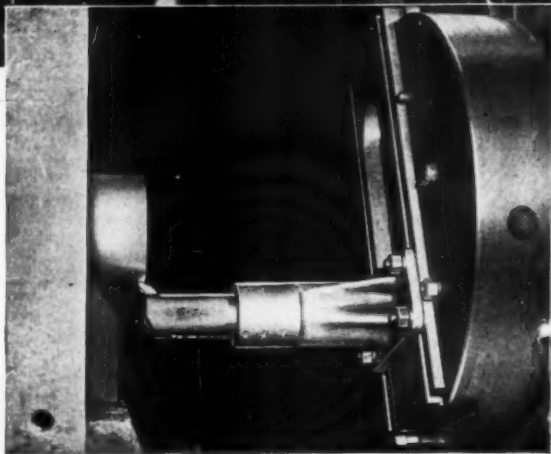
8201 ST. AUBIN, DETROIT 11, MICHIGAN
MADISON 6824

How to



(Above) Trunnion being turned on a G. & L. Horizontal using a Continuous Feed Facing Head.

(At Right) Close-up of Continuous Feed Facing Head showing telescopic tool holder and cutting tool as it rotates around stationary trunnion.



GIDDINGS & LEWIS
144 DOTY STREET

use your G&L

For Unusual Turning Operations

**Continuous Feed Facing Head
Finishes Trunnions to .0005"**

Limits . . . Accurate Parallelism

Maintained • Here is a hard-to-handle armament part which requires a trunnion turning and flange facing operation. The part is large and awkward to machine on conventional turning equipment. Using a G. & L. Horizontal Boring Machine with Continuous Feed Facing Head, the trunnions were turned without difficulty and held to rigid parallel requirements. It is an interesting example showing how the horizontal boring machine can be used to supplement other equipment and to do those unusual turning jobs which would be difficult to handle on lathes or vertical mills.

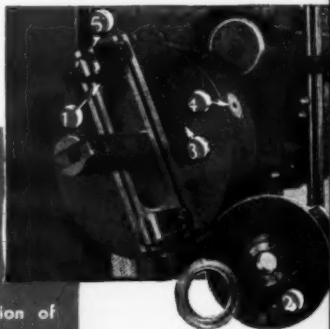
Mounting the workpiece is illustrated on opposite page. A telescopic tool is used in conjunction with the Continuous Feed Facing Head. Unlike conventional turning, where the work rotates, here the work is stationary and the cutting tool turns.

The Continuous Feed Facing Head can also be used for boring, recessing, back-facing and threading. Similar work in your own plant may be handled better and easier using this attachment. Our engineers will be glad to advise you and make recommendations. There is no obligation for this help.

Continuous Feed Facing Head Showing Five Outstanding Structural Features :

- 1—Tool Slide . . . has six separate power feeds ranging from .009" to .118" per revolution of head.
- 2—Feed Selector. Control is provided for selection of any one of six feeds.
- 3—Directional Control . . . lever points in direction of tool slide feed.
- 4—Micrometer Adjustment . . . graduated to .001" for tool slide adjustment.
- 5—Two Tool Holders for $\frac{3}{4}$ " square bits furnished as standard equipment*.

*We do not furnish tools—only tool holders.



Write for Additional Data

A complete description of this attachment is contained in this free booklet. When requesting your copy, indicate type and size machine used. Ask for Bulletin No. BB124.



MACHINE TOOL COMPANY
FOND DU LAC, WIS.

At Right: Small shutter parts being honed on Sunnen "MA" Precision Honing Machine.

Below: Navy photographer using Fairchild F56 Aerial Camera with $8\frac{1}{4}$ " focal length for oblique photography



**Precision-Built
FAIRCHILD
Aerial Cameras**



ACCURACY IN ACTION!

—made possible by

SUNNEN HONING

For high precision work on small vital parts, Fairchild uses Sunnen honing. After grinding, these parts are honed to extreme accuracy — often within .0001". The inside surfaces of these diameters must be polished to a super-smooth finish to reduce friction on bearing surfaces — for these parts must operate faultlessly at temperatures from -70° F. to 165° F.!

Remember — the Sunnen Model "MA" Precision Honing Machine handles any diameter from .185" to 2.625" with a guaranteed accuracy of .0001" and a finish of 2 to 3 micro inches.

Write for new bulletin giving complete information!



The coveted Army-Navy "E" waves over the Sunnen plant — evidence of the important part Sunnen equipment is playing in the war effort.

SUNNEN PRODUCTS COMPANY

7935 Manchester Ave., St. Louis 17, Mo.

Canadian factory: Chatham, Ontario

SUNNEN



Typical Jobs



Aircraft Hydraulic Brake Cylinder. Honing 3 times faster than lapping — and gave a straighter hole.



Aircraft Valve Tappet Roller. Honed after grinding to give 100% bearing surface.



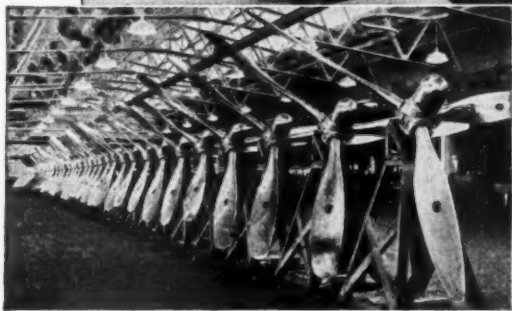
Aircraft Carburetor Operating Valve Sleeve. Sunnen honing eliminates distortion from assembling operation.



Hydraulic Control Bushing. Honing gives straight round hole after rough reaming.



Aircraft Piston Pin. Sunnen honing is twice as fast and gives a cleaner, better looking pin.



Jarvis POWER TOOLS

Hundreds of these Jarvis Propeller Sanding, Polishing and Buffing Machines are working around the clock. They speed the production of aircraft propellers in all the leading propeller plants of the Nation.

THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.
TAPPING ATTACHMENTS • FLEXIBLE SHAFT MACHINES • GROUND ROTARY FILES



**SPEED UP YOUR
PRODUCTION**

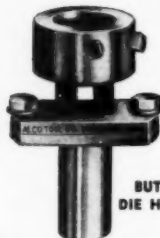
ALCO



**DRILL
CHUCK**



**ACORN
DIE HOLDER**



**BUTTON
DIE HOLDER**



**TAP
HOLDER**

You can completely equip your screw machines with ALCO tools for every drilling, tapping, reaming and thread cutting operation and get more and better production at less cost because . . .

1. No bushings are needed. Drills and taps are held securely. No time lost in making special size bushings.
2. Change the drill or tap size without changing the chuck . . . each ALCO holder will accommodate several sizes.
3. Accurate concentricity is accomplished and guaranteed by the special Alco adjustment.
4. Taps and dies last longer because of the concentric alignment.
5. Every thread cut perfect, no taper threads, no rejects — each one die-true.

Send for latest
catalog No. 5

ALCO EFFICIENT TOOLS

THE ALCO TOOL CO., 252 Birdseye St., Bridgeport, Conn.

Detroit Office: 908 Stephenson Bldg., Phone Madison 5870
Chicago Office: 6219 So. Kenwood Ave., Phone Hyde Park 6807

**FEEDS
FOR CUTTING TOOLS
AREN'T RATIONED!**



GIVE 'EM ALL THEY'LL TAKE!



**USE THE FASTEST CUTTING SPEEDS AND
HEAVIEST FEEDS POSSIBLE, ON EVERY JOB**

Good Turret Lathe practice dictates
that easily adjusted tools should be run
at speeds and feeds that require
tool grinding every four hours.



★ Reproductions of this page on enameled paper are available in 8 1/4" x 10 1/2" size for bulletin-board use in your turret lathe department. Write the Gisholt Machine Company, 1185 East Washington Avenue, Madison, Wisconsin. Ask for the series of "Wartime Care and Operation Posters." State quantity desired.

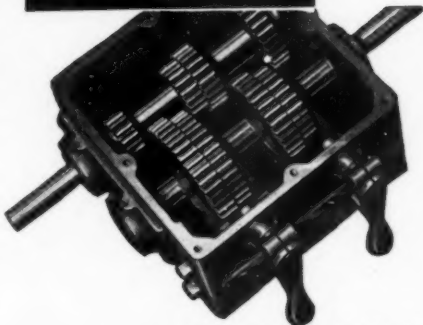
SPEED UP RECONVERSION

with

TURNER
UNI-DRIVE
Motorizes Machine Tools

- 1** No belts to shift. Drives to large step of cone at all speeds.
- 2** Eliminates overhead line and counter shafts.
- 3** All advantages of geared head, with belt drive smoothness.

Reconversion will call for speed and more speed. Be ready with TURNER UNI-DRIVE. Now helping to bring schedules through on time in hundreds of plants. Cuts costs. Saves time. Eases operators' work. Increases production capacity up to 25% - 100% - 300%. Each unit operates independently of all others—high and low speeds at will. See your dealer or write us.

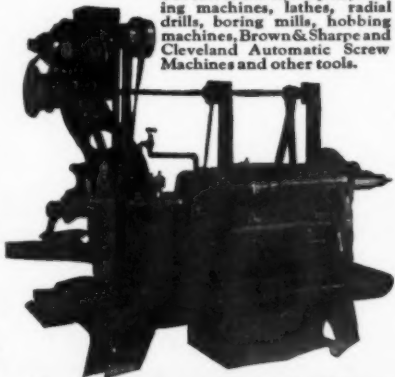


For turret lathes, shapers, milling machines, lathes, radial drills, boring mills, hobbing machines, Brown & Sharpe and Cleveland Automatic Screw Machines and other tools.

OUTSTANDING PERFORMANCE FOR THESE TYPICAL USERS

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The TURNER UNI-DRIVE COMPANY

(Sales Division: Turner Machinery Co.)

3416 Terrace St.

Kansas City 8, Mo.

PRODUCING MACHINE TOOL DRIVES • ORDNANCE TOOLS • AIRCRAFT FITTINGS

Could you finish both ends
at the same time?



Or would you do the job
slower on 2 machines?

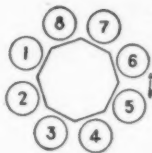
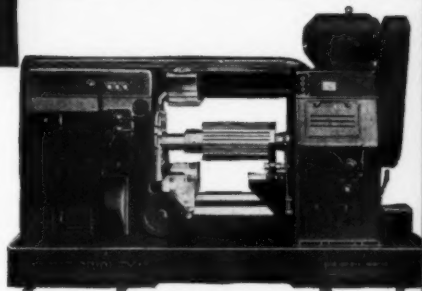
Could you finish both ends at the same time (or would you do the job slower—on 2 machines)?

It's the bronze forged M-20 booster, a war job—tooled for double indexing with 2 sets of tools cutting simultaneously on an ACME-GRIDLEY 8-Spindle Chucker.

These new machines with their adaptability to handling many operations at one time are actually 2% times faster than the machines of ten years ago—in spite of the tougher alloys, higher tolerances and faster speeds demanded by modern standards.

In the highly competitive markets ahead, ACME-GRIDLEYS will help to turn out better products at lower cost, and therefore lower selling prices. They are more than mere production machines—they are sales producers.

Send for booklet "How Costs Were Cut on 25 Chucking Machine Jobs".



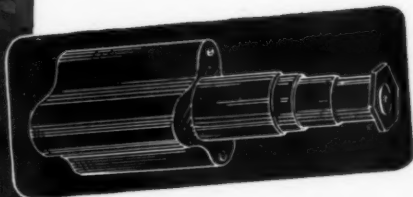
With this machine arranged for double indexing, operations on the large end of the part illustrated were done in spindle positions 2, 4, 6 and 8. The part was then repositioned and the operations on the small end were done in spindle positions 1, 3, 5 and 7. This one machine did a two-machine job.

THE **NATIONAL ACME** CO.

170 EAST 131ST STREET • CLEVELAND 8, OHIO

ACME-GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND TAPS
THE PERMILITE • LIMIT MOTOR STARTER AND CONTROL STATION SWITCHES • SOLENOIDS • CENTRIFUGES • CONTRACT MANUFACTURING

SEE THIS *Faster*
WAY OF PLANING
CURVED SURFACES !



7 TIMES FASTER
THAN BY HAND

"Turn to Turchan"

SEND US
Sample or Blueprint
of Parts for Turchan
Production Estimate

In the planing of irregular-shaped parts, the Turchan Follower method makes possible a production rate greater than anything ever before attained.

Take, for example, the gear-like impeller illustrated above, measuring approximately 1 ft. in diameter. Using a template as a guide, the Turchan Follower Attachment completely finishes the three gear-like surfaces to a tolerance of .001" in 1-7th the time required by hand methods — incidentally, doing successfully what two other devices failed to perform.

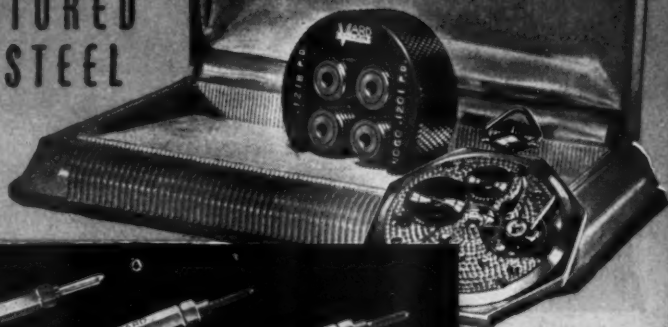
Equally amazing are the savings in production time when the Turchan Follower is used to finish parts of irregular or eccentric shape on milling machines, lathes, grinders, shapers or boring mills. If you have a production problem on parts of this character, please read our invitation in the left-hand column.

TURCHAN

Hydraulic Follower Machine

Turchan Follower Machine Co.
8253 Livernois Detroit 4, Mich.

EXPERIENCE
CAPTURED
IN STEEL



Uniform, mass production of high precision parts is made possible by the use of simple yet extremely precise small hand gages. VARD makes these gages and carries in stock, ready for shipment on order, numbers of gage members and handles in thread sizes from 0-80 NF to 1½ in. NC. Cylindrical gages are always made to order. Tapered pipe thread plug gages in sizes of 1/16 in. to 2 in. inside pipe diameter are carried in stock. Pipe gages comply with specification AN-GGG-P-363.

VARD makes on order all types of cylindrical, taper and thread gages in standard or special thread forms.



VARD stands for Verity • Accuracy • Responsibility • Durability

VARD INC.

PASADENA 8, CALIFORNIA



CONSERVE PRECIOUS TOOLS

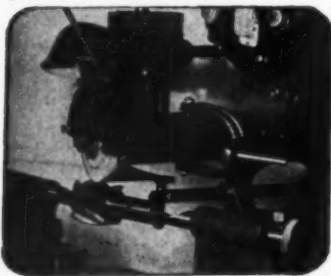


With CIRCULAR RELIEF GRINDING!

ONE MACHINE is all you need to grind your valuable tools *the right way*... without needlessly grinding away metal that supports the cutting edge of the tool.

CIRCULAR RELIEF GRINDING follows the contour of the tool, leaving maximum support behind the cutting edge and contributing to longer tool life.

ONE OPERATION and one machine, instead of four operations and two machines... that's the CIRCULAR RELIEF way! It saves you time and labor as well as tools and money. Send for the free circular and get the whole story. You'll be glad you did!



Note from diagram how CIRCULAR RELIEF GRINDING follows the curve of the tool, grinds right up to the cutting edge, and does not cut away valuable metal supporting the cutting edge.

CLEVELAND

TOOL ENGINEERING COMPANY

1249 W. 4th ST.



CLEVELAND 13, OHIO



More And Better Threads Per Tap?

Threadwell COLD-TEMPER

Has The Answers Down Cold!

Question: Why do taps need to be cold-tempered?

ANSWER: The new, scientific cold treatment at 120° below zero, pioneered by Threadwell in the tap field, makes COLD-TEMPER Taps harder yet less brittle than high speed taps receiving only the usual heat treatment. Threadwell Cold-Temper Taps are recommended for cutting steels, cast iron, alloys, plastics and abrasive materials. Performance tests have proved that they cut *more and better threads per tap*.

Question: Do Threadwell COLD-TEMPER Taps cost more than ordinary high speed taps?

ANSWER: No. This extra treatment is simply a plus value for users of Threadwell Taps, at no extra cost.

Question: How can I be sure that the taps I buy are genuine COLD-TEMPER Taps?

ANSWER: By specifying *Threadwell*. All Threadwell High Speed Taps are now cold-tempered. You can identify

Threadwell Taps not only by the name on the shank but by the color "*i-dot-tification*": (red dot for high speed cut thread, white dot for commercial ground, blue dot for precision ground) and by the Threadwell transparent plastic "*Tap-Capsule*" which provides every ground thread tap with complete protection and makes it easy to identify size and type before unwrapping.

Question: Where do I get COLD-TEMPER Taps?

ANSWER: From your local Threadwell Tap distributor, who has been carefully selected to provide the same *personal attention* service we give every order at the factory.

Ask us to send you the name of the Threadwell Cold-Temper Tap Distributor nearest you, together with a complimentary copy of the Threadwell *Tap Book*, full of practical suggestions on how to cut better threads at lower cost.

DISTRIBUTORS IN LEADING INDUSTRIAL CENTERS
THROUGHOUT AMERICA
EXPORT STOCKING DISTRIBUTORS
CANADA, Bridge Machinery Co., Montreal;
ENGLAND, Skyles Ltd., London and John H. Graham and Co., Inc.,
THROUGHOUT THE WORLD



THREADWELL

TAP AND DIE COMPANY • GREENFIELD, MASSACHUSETTS, U.S.A.



**SAVE TIME and THE USE of
EXPENSIVE EQUIPMENT for
KEYWAY CUTTING...**

The
GLENNY adjustable-expansion
Push **BROACH**

**ON YOUR ARBOR PRESS
WILL CUT KEYWAYS**

**10 TIMES FASTER
THAN A SHAPER**

Factories everywhere are replacing many keyway and slotting operations with the Glenny Broach on an Arbor Press or other tool. They report savings of 10 times—or better, with every piece accurate to $\pm .0005$.

One Keyway or Quantity Production

Whether an occasional keyway or slot, or quantities, the Glenny Broach will save production time and costs.



**ACCURACY OF $\pm .000$
ON EVERY PIECE**



**SEND
FOR
BULLETIN
9**

$\frac{1}{4}$ " keyway,
 $\frac{1}{8}$ " deep in
Aluminum
Sleeve. A quantity
production
operation.



**Patent
No. 2,184,383**



$\frac{1}{8}$ " keyway,
 $\frac{1}{16}$ " deep in
Bronze Bush-
ing. An important
operation
for Plane pro-
duction.

DEPT. A, EAST SHORE MACHINE PRODUCTS CO.

835 EAST 140th STREET

CLEVELAND 10, OHIO, U. S. A.

FORMERLY Grinders operated at 4,000 r.p.m.—had to discard wheels when worn to 3".



RIGHT TOOL

**25% MORE METAL REMOVED
....WHEEL LOSS CUT 44%.**

THIS Wisconsin foundry used 6,000 r.p.m. air grinders with 6" wheels to clean gear-case castings. Many spots were tough to reach. When wheels wore down to 3" diameter, they were thrown away—a wasteful practice but necessary in order to get the grinding efficiency of new wheels—until:

The Rotor Application Engineer was called in and recommended 8,500 r.p.m. Rotor Air Grinders. These could use the 3" wheel stubs. Result:

25% faster grinding because 3" wheels cut faster at the higher speed (8,500 r.p.m.) and allowed operator to get in tight places easier. Tool speed was adequate for the small size wheel.

44% saving in wheel cost.

Cleaner castings and fewer rejects.

Find out from the Rotor Application Engineer if similar improvements in your portable tool operations can be made. No obligation.

Yours for the *right tool*,

AIR O'TOOL

AIR

THE ROTOR TOOL

CLEVELAND, OHIO

HIGH
CYCLE

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

"BASIC UNIT+PARTS" PLAN



Gives you **EXACTLY** the High Speed Production Lathe you need — at **Lowest Cost**

(LEFT) **BASIC UNIT OF THE MINNEAPOLIS PRODUCTION LATHE** to which you can add only the equipment needed for your particular production "set-up". 4 different drives.



Special set-up speeds up brake band production.

(RIGHT) A SET-UP "TAILOR-MADE" FOR CUSTOMER'S NEEDS

A delivery bottle neck was broken by machining 3 brake band segments at a time with this special arrangement of Minneapolis Production Lathe. Special face-plate holds 3 segments. Counterbalanced loading fixture mounted on carriage is swung back for refill while lathe is operating.

SMALLER INVESTMENT — Lower Production Costs

The "MINNEAPOLIS" Production Lathe is extremely adaptable to any production set-up, particularly second operation work. Its simplified design and ease of control enable inexperienced operators to turn out high speed volume production.

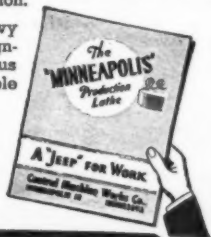
The "MINNEAPOLIS" has 2 1/4" collet capacity, 14" swing, heavy duty spindle assembly. It is backed by more than 50 years designing and manufacturing experience. Send for literature — write us your production problems. Send sample part or drawing if possible — let us quote you on a "tailor-made" lathe for your work.

CENTRAL MACHINE WORKS CO.

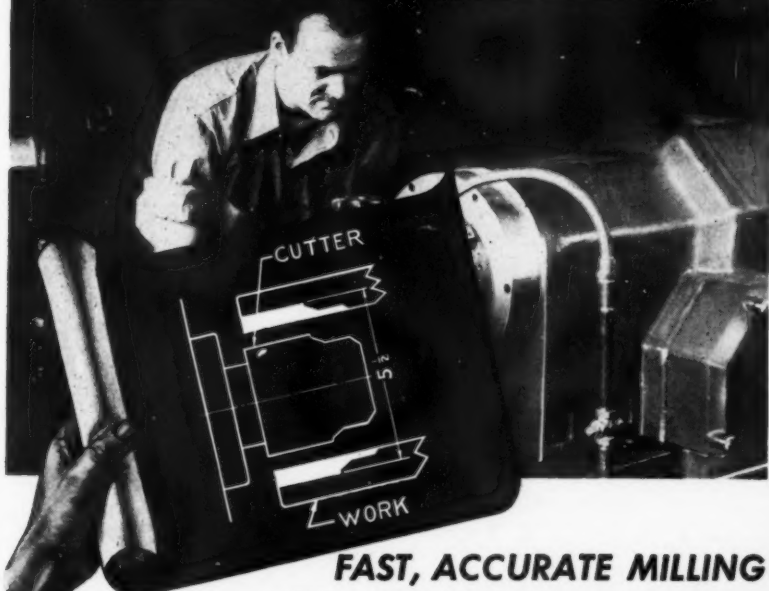
Machinery designers and manufacturers since 1890

1224 Cental Avenue,

Minneapolis 13, Minnesota



PLAN-O-MILLING



"FIRSTS"

WITH PLAN-O-MILL



1st to install General Electric's remarkable new Thyro-trol electronic feed control!

1st planetary to mill external threads with multiple thread cutter!

1st planetary to coordinate feeds and speeds!

1st to provide absolute control of feed-in!

FAST, ACCURATE MILLING OF CYLINDRICAL FORMS

You get the speed and high production of special purpose equipment when you replace wasteful, obsolete machines with Plan-O-Mill.

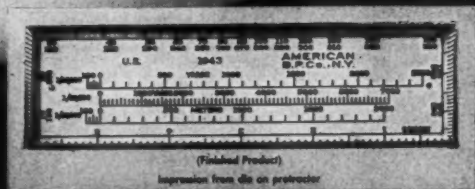
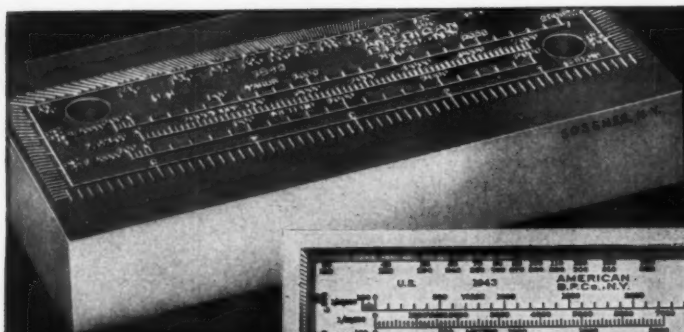
Yet Plan-O-Mill is flexible. A slight tooling change adapts it to a wide variety of thread milling and form milling jobs.

Plan-O-Mill saves manpower too! It is semi-automatic, can be operated by semi-skilled or unskilled labor. One man or woman can operate two or more Plan-O-Mills.

Find out about Plan-O-Mill today! Contact your machinery supplier or write direct.

PLAN-O-MILL CORPORATION

1511 East Eight Mile Road • Hazel Park, Michigan



STEEL STAMPS AND DIES *for precision marking*

For stamping calibrations and numerals in micrometers, protractors, rules, dials, and all graduated precision measuring tools. Accuracy maintained to .0001 inch. For use on all types of metal and processed materials. All dies are carefully hardened to insure maximum production.

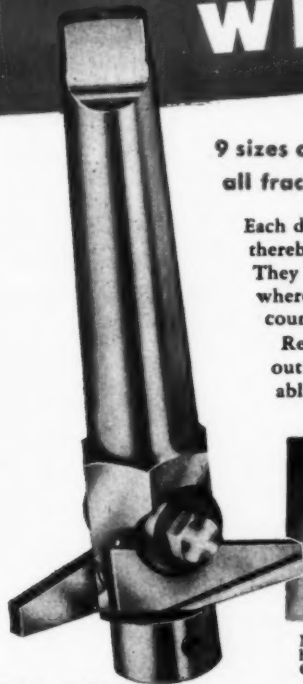
ALSO:
TAPS
GAGES
CUTTING TOOLS



SOSSNER

161 Grand Street, New York 13, N. Y.

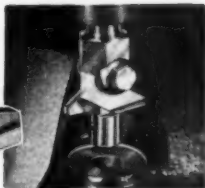
WHY USE 63 WHEN 9 WILL DO?



9 sizes of Clark Adjustable Counterbores cut all fractional diameters from $\frac{1}{4}$ " to $5\frac{1}{2}$ ".

Each does the work of 7 or more fixed-radius cutters, thereby reducing tool inventory costs considerably. They are particularly suitable for tool rooms, where tool and die makers are constantly needing counterbores of different sizes.

Recommended surface speeds are faster, and without chatter. Exclusive, burr-preventing interchangeable pilots available from $\frac{1}{16}$ " up, by sixteenths.



No de-burring of pilot holes necessary with Clark Counterbores.



Clark Counterbores spot face as well as bore

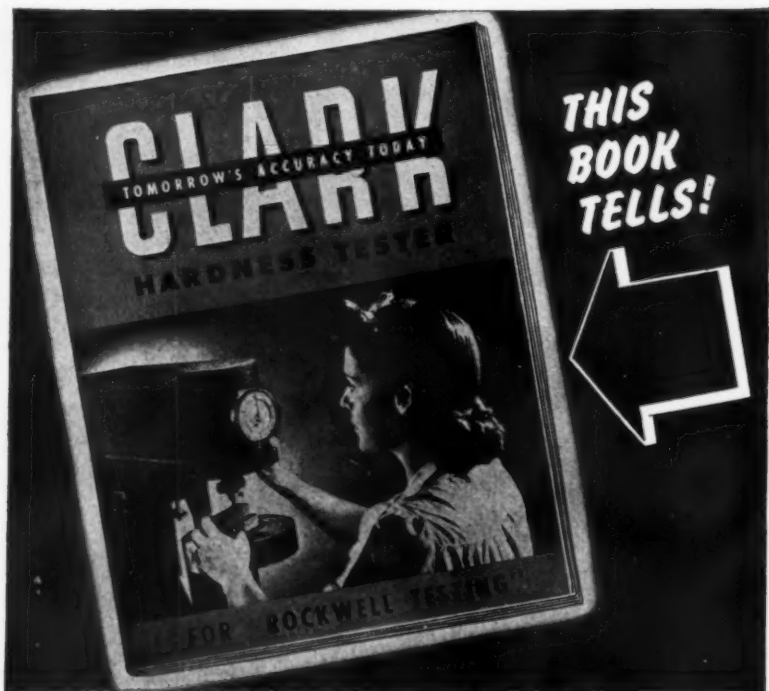
Clark Adjustable Counterbores are easily expanded. Simply loosen the locking bolts and slide cutting blades in or out. Blades are removable for sharpening.



Write for bulletin **MTB-12** and call your Clark Cutter Jobber today

DO YOU KNOW THE TRUTH

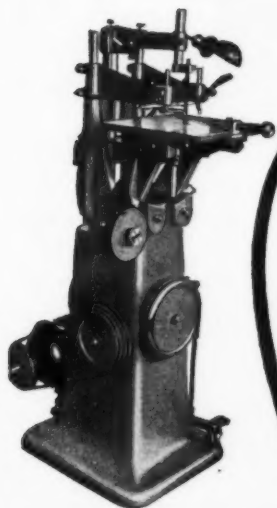
About Hardness Testing?



CLARK
TOMORROW'S ACCURACY TODAY
CLARK
HARDNESS TESTER

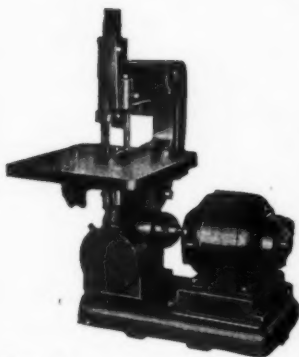
The new Clark catalog is more than a catalog.

It is a 20-page reference manual on the history, theory, practice, and equipment for modern, scientific hardness testing. Printed in two colors, size 8½"x11", it is available without charge to manufacturing executives. Just drop a line on your letterhead to Department BB, CLARK INSTRUMENT INC., 10200 Ford Road, Dearborn, Michigan.



OLIVER OF ADRIAN

The
OLIVER
 DIE MAKING MACHINE
Saves
50% to 60%
 OF THE COST OF
 MAKING EXPENSIVE
 DIES, GAGES,
 TEMPLATES
 AND CAMS



Type S-1

These handy bench type die making machines have $3\frac{1}{2}$ " throat, which permits sawing to the center of a 17" circle. Tool steel up to 1" thick may be sawed & filed. Table is 10" square. Tilts 10° to right, left and front. 16" table is available at extra cost.

Let us send bulletins giving full information on Oliver die making machines. Prompt deliveries offered.

This versatile machine is equipped with every useful device for the rapid production of dies and similar tools.

It has capacity for sawing and filing in metals up to 3" in thickness, and filing still heavier materials with a shorter stroke. Stroke is adjustable from 0" to 5" and 6 speeds are provided from 100 to 300. Sawing can be handled to the center of a 20" circle.

Table is 14" square, tilting 15° to the right, left and front, and 3° to the back.

Hydraulic feeding device provides constant controllable pressure on the down stroke of ram and relieves pressure entirely on up stroke. Feeding pressure is adjusted so that if left to itself, will feed a short distance and stop, preventing inadvertent work spoilage.

OLIVER INSTRUMENT COMPANY
 1408 Moumee St., E Adrian, Mich.

We also build Drill Grinders, Tool and Cutter Grinders, Face Mill Grinders, Template Tool Bit Grinders.

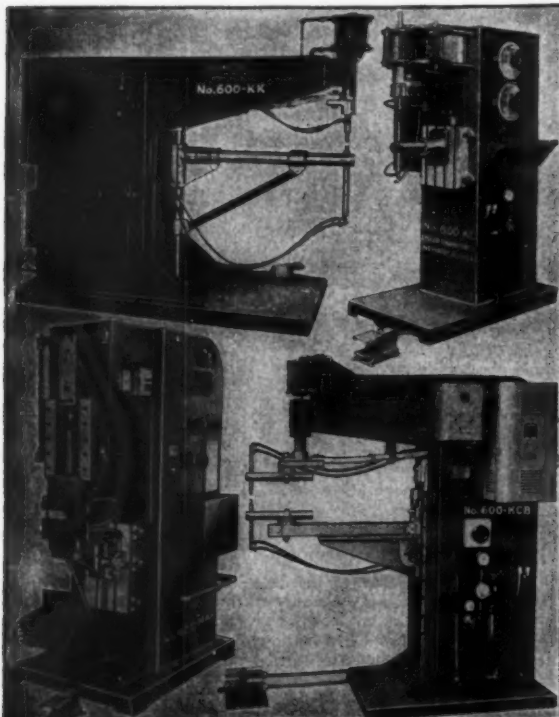
WELDERS

SPOT · BUTT · ARC

We manufacture a complete line of resistance spot welders from 1/4 to 300 KVA for all types of welding. There is an EISLER WELDER for every purpose.

WRITE FOR CATALOG

WE INVITE CONTRACT SPOT WELDING IN LARGE OR SMALL QUANTITIES.



ARC WELDERS
100 to 400 AMPS.



BUTT WELDERS



**FOOT
AIR
MOTOR
OPERATED**

SPOT WELDERS



**PRESS
TYPE**

SPOT WELDERS
FOOT, AIR
OR MOTOR OPERATED

CHAS. EISLER
EISLER ENGINEERING CO.

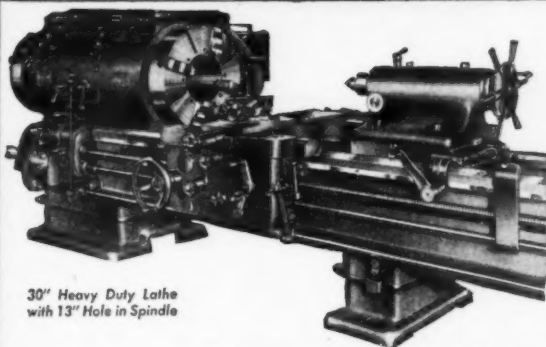
762-SO. 13th ST. NEAR AVON AVE. NEWARK N. J.

News of the 35



HYDRATROL Lathes

Which Effected These 4 Outstanding Savings and Efficiencies in a Large War Plant!*



30" Heavy Duty Lathe
with 13" Hole in Spindle

5 sizes-18" to 36"

Small, 18" up to 7-1/4" Hole

Medium, 24" up to 12" Hole

Large, 27" up to 13" Hole

Large, 30" up to 14" Hole

Large, 36" up to 16-1/2" Hole

(Standard Type)
lathes, 16" to 36"

(From Letter in Our Files)

*"First, the adaptability and the ease of handling the _____ in and out of the Hydratrol Lathes increased operating efficiency 15 to 20%.

"Second, the roughing operations cut the operating time in half, as performed in plants using conventional equipment.

"Third, finishing the end of _____ consisting of rough and finish bore and grinding, face and finish turn, was reduced from 16 hours to 5 hours.

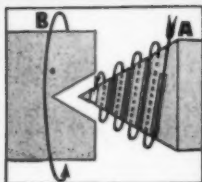
"Fourth, finish turn operation was reduced from 8 hours to 4 hours."

Why not investigate the possibilities of the Large Hollow Spindle Type of HYDRATROL LATHE in YOUR plant?

Lehmann MACHINE COMPANY

CHOUTEAU AT GRAND . . . ST. LOUIS 3, MISSOURI

The work stays cooler with...



Arrow A shows flow of lubricant around helical groove.



Helical Groove **CENTERS**



Heat, generated in work by cutting tools, is expelled more rapidly by the CMD Helical Groove Center. Its exclusive left-hand helical groove lubricates the entire bearing surface of the work and the center. Additional lubricant can be added without stopping the machine. No dripping or crushing out of the lubricant. Expansion of the work is kept at a minimum. For faster production, specify CMD Helical Groove Centers.

Canadian Distributor: A. N. ORMSBY CO., Toronto, Ont.

Write for FREE Sample Kit

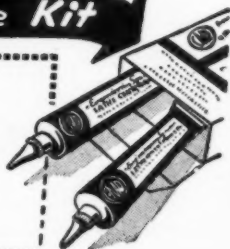
CHICAGO MANUFACTURING & DISTRIBUTING CO.
Dept. 12BB, 1928 West 46th St., Chicago, Ill.

- ☐ Send circular on CMD Helical Groove Centers.
- ☐ Without obligation to us, send FREE sample kit containing a tube of CMD CENTER POINT OIL and a tube of CMD CENTER POINT LUBE (grease) with directions for making an amazing, simple test.

NAME

FIRM NAME

ADDRESS



THE CONE AUTOMATIC MACHINE COMPANY



sees many

GOOD THINGS AHEAD

It is reported that

The soybean is now the third largest cash grain crop in the United States.

get ready with CONE for tomorrow

Aluminum can now be chemically bonded to steel so that the two become a completely integrated unit. This process has already contributed greatly to improvement in the horsepower per pound ratio of certain of our aircraft engines.

get ready with CONE for tomorrow

A 200 page book may now be printed on both sides of a 6 x 9 inch sheet and enlarged for reading by the use of a new machine. This would bring the cost of books to about five cents per volume. It is estimated that a full size encyclopedia, printed by this method, would cost about three dollars.

get ready with CONE for tomorrow

One authority states that oil can be produced from American shale in commercial quantities and at a competitive price.

get ready with CONE for tomorrow

Zein, the new shellac substitute derived from corn, is being used in shoe soles and heels, cements, rain coats, mats, gaskets, and rubber stamps. Packaging films, textile fibers, and bottle caps may be expected later.

get ready with CONE for tomorrow

Most radical of all the new power plants is one in which the fuel is burned in gas mantles and the radiant energy produced is converted into electricity by photo-electric cells.

get ready with CONE for tomorrow

Pure iron can now be deposited on non-metallic substances. By this method a surface of iron may be put on a base of rubber, wood, or plastic.

Some of the new paper-resin laminates may now be formed as easily as a cook lines a plate with pie crust, and require pressures as low as 50 lbs. per square inch.

get ready with CONE for tomorrow

Glass fabric impregnated with synthetic resin is a new material with extraordinary properties. Tensile strength may be more than 80,000 lbs. per square inch.

get ready with CONE for tomorrow

Five states have pooled their electrical generating capacity with results equalling the addition of 135,000 horsepower. This practice is expected to spread.

Aerial photography can show whether the soil of a particular area is gravel, sand, silt, or clay.

get ready with CONE for tomorrow

A new lacquer can be baked on to metal surfaces and removed by heating above 212° F.

get ready with CONE for tomorrow

An experimental Diesel engine weighs only eleven ounces per horsepower and can operate on either Diesel oil or gasoline.

get ready with CONE for tomorrow

A Canadian manufacturer of railroad equipment has designed a flat-car to be used as a landing place for helicopters.

get ready with CONE for tomorrow

The "axonograph" is a device that photographically produces an axonometric drawing directly from a blueprint.

**This machine cuts
its own weight
in metal in
four days**



215" 6-Spindle Gammacut

To produce the part shown, 6 pounds of chip — over a sixth of a ton of metal per hour — were removed from WD1314 bar stock.



CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.



(Above) Checking runout on gear. Work is mounted between centers and rotated with one hand. Indicator clamp stand is controlled by operator's free hand as shown.

USING one hand to control all moving elements on the Sundstrand Bench Center, the operator's other hand is free to control the part being checked. The indicator support is easily controlled with one hand. It is moved away from the work when loading and unloading, and against the work for checking runout.

For rapid loading and unloading, the spring loaded center can be quickly clamped and unclamped by using headstock center clamp. After unclamping, the center is retracted by slight hand pressure on the center retractor lever.

Either headstock or tailstock can be unclamped, positioned and reclamped

HOW

"One-Hand Control

Speeds

Precision Checking

Runout Checked to Within

.0001" Limits on Sundstrand

Bench Centers



(Above) Sundstrand Bench Center showing standard parts.

by one hand using the headstock or tailstock top lever clamps.

These easy and simple operating features speed checking for runout. Shoulders, faces or variations from true circular form on work such as gears, sprockets, shafts, pinions, or practically any parts which can be rotated between centers, may be checked on this Bench Center. Here is a practical addition to your tool room, production or inspection department.

Range of Sizes:

6" x 18"	12" x 36"	12" x 60"
6" x 36"	12" x 48"	12" x 72"



SUNDSTRAND MACHINE TOOL CO.

Slipballs • Fluid-Screw Slipballs • Automatic Lathes • Hydraulic Equipment • Drilling and Centering Machines • Special Milling and Turning Machines

2535 ELEVENTH ST., ROCKFORD, ILLINOIS, U. S. A.

The HEAVY HAND *with a DEFT TOUCH*



Straightening a heavy forging to locate deflection. The traveling table speeds this operation just as it does planing, turning, and other operations.



BIG FORGINGS "GO STRAIGHT" IN A HURRY WHEN THIS ELMES PUTS ON THE PRESSURE

Bars, quill shafts, piston rods, and other heavy forgings come from annealing furnaces to this 660-ton Elmes straightening press at Plant No. 1 of A. Finkl & Sons Co., Chicago. Sizes range up to 12-in. diameter, yet the Elmes press with its 17-ft. long bed and traveling table can be served conveniently at either end from above—and Elmes positive hydraulic pressure under accurate control can be applied in just the right amounts at just the right places to remove heat-treatment distortion quickly.

TRAVELING TABLE SAVES TIME

The traveling table is equipped with heavy adjustable V-blocks and with air-actuated roller lifts which enable the operator to revolve the part for inspection and for straightening to forging tolerances. Mr. A. R. Lane, Works Manager, says they have had no trouble whatever and that during the two and a half years this press has been on the job it has done good work, dependably.

Put your pressing problems up to Elmes. Nearly a century of specialization is your assurance of expert recommendations and performance at its best. Elmes Engineering Works of American Steel Foundries, 244 N. Morgan St., Chicago 7. Also made in Canada.

STRAIGHTENING PRESS MODEL No. 5990

Capacity 660 tons. All steel, self-contained with long bed and power-traveling table.

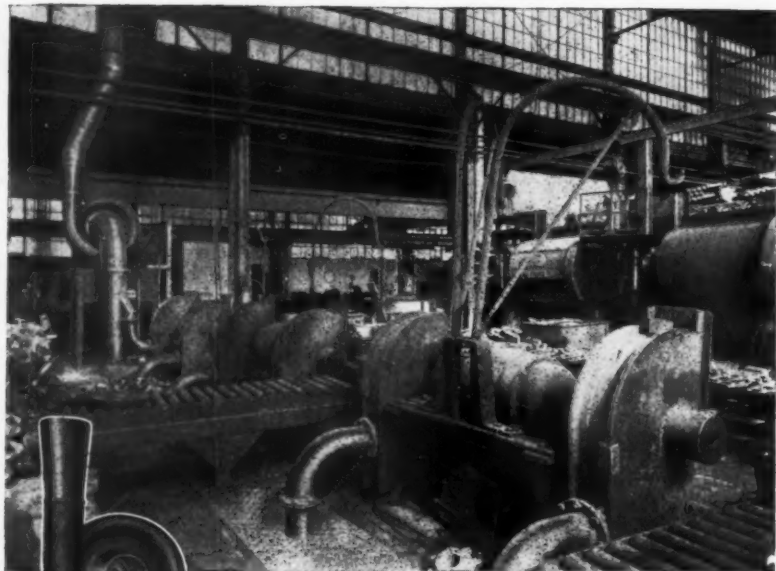
WHAT TYPE OF PRESS SHOULD YOU HAVE?

Forcing, forming, die sinking, extruding, straightening, bending, plastics molding, and many other operations are routine on Elmes presses because Elmes equipment is thoroughly dependable and Elmes simplified controls are fast, accurate, instantly responsive.

Standard designs include the full range of types and sizes, yet development of special arrangements or adaptations constitutes an important part of Elmes engineering service. Write today for literature on the type of press you need, or for suggestions on how best to apply hydraulic force to cut production costs. Let Elmes experience be your guide in planning for tomorrow.

ELMES HYDRAULIC EQUIPMENT

METAL WORKING PRESSES · PLASTIC MOLDING PRESSES · EXTRUSION PRESSES · PUMPS · ACCUMULATORS · VALVES · ACCESSORIES



THERE IS A ROTO-CLONE FOR EVERY GRINDING DUST

There is a type and size of Roto-Clone for every dust requirement — equally effective for all types of metal grinding service, from rough snagging in foundries to finest finish grinding in the production of precision equipment.

Roto-Clone offers exclusive advantages of economy of space and piping combined with low power consumption and highest efficiency in dust separation. Send for complete engineering data and Bulletin No. 272.

Type D Roto-Clone

The original Dynamic Precipitator for the dry collection of granular dust — capacities from 200 to 20,000 c.f.m.



AMERICAN AIR FILTER COMPANY, INC., 312 CENTRAL AVE., LOUISVILLE, KY.

IN CANADA, DARLING BROTHERS, LIMITED, MONTREAL, P. Q.

Picture This **POPE** PRECISION SPINDLE
on Your
MACHINES



This POPE Vertical Motorized Spindle with sealed lubrication, totally enclosed, fan cooled motor and super-precision bearings means better work and more of it.

The coolant is led down through the hollow spindle, cooling motor and bearings on its way to the inside of the cup wheel where it is most effective for cooling the work.

This Spindle, like all POPE Precision Grinder Spindles, will give you more production and finer finishes. Ask us to send you Data Sheet T from which we can furnish recommendations and estimates.

POPE Vertical Spindles are available with 3, 5, 7½ or 10 HP Motor. Speed may be 600, 750, 900, 1200, 1600 or 3600 RPM, 60 cycle AC current. Even higher speeds obtainable with frequency changes.

POPE Vertical Motorized Spindles are used not only for surface grinders but for a variety of other purposes. Where working loads are largely radial, bearings are arranged to take care of them.



REG. U. S. PAT. OFF.

POPE MACHINERY CORPORATION

ESTABLISHED 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS
BUILDERS OF PRECISION SPINDLES

**RIGHT to the Point—for
HIGH SPEED PRODUCTION**

MOTOR TOOL LIVE CENTERS

effectively put an end to burn-outs—breakdowns—work spoilage—AND THE CONTINUOUS EXPENSE OF CENTER REPLACEMENTS. Their outstanding performance on high speed war production is convincing proof of how they can save for you.

Write for descriptive folder



MOTOR TOOL MANUFACTURING CO.
METAL CUTTING TOOLS

1123 CORTLAND AVENUE • DETROIT, MICHIGAN

*Make it a Rule
to Call Motor Tool*

X THERE'S A SPOT IN EVERY METAL-WORKING PLANT

for a



• The Wells No. 8 Metal Cutting Band Saw doesn't need much floor space. Every plant has a spot for one—and what a *busy* spot that becomes—for a Wells is a machine that always finds plenty of work. You can use it for all the odd cutting jobs and free large production units. And you will find it accurate, efficient and economical on certain production runs too.

The Wells will cut most any shape, size or type metal you can get into it . . . quickly and with a minimum of labor. What's more, one of the Wells' best features is that it can easily be moved to any job to save the time and labor of bringing the work to the saw.

You'll be wise to mark an X on the spot in your shop where you intend to put a handy Wells to work cutting metal economically and efficiently.



SPECIFICATIONS WELLS No. 8.

CAPACITY: Rectangular . . .	8" x 16"
(Special Guides) . . .	5" x 24"
ROUNDS:	8" diameter
MOTOR:	1/2 H. P., current optional
SPEEDS:	Selective 60, 90, 130 feet per minute
WEIGHT:	Approximately 750 pounds

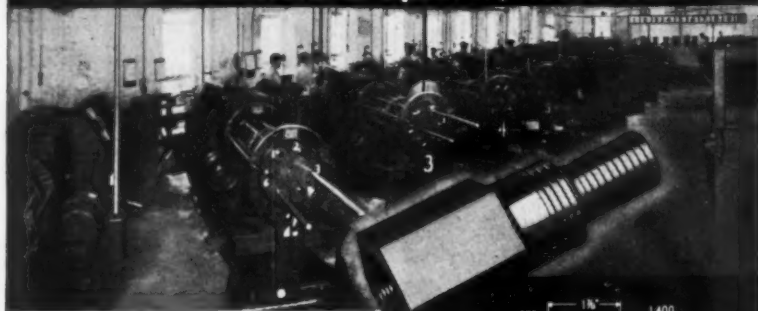
WELLS
MADE IN U.S.A.

Wells

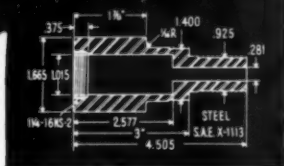
Products by Wells are Practical
**METAL CUTTING
BAND SAWS**

WELLS MANUFACTURING CORPORATION
707 COOLIDGE AVE., THREE RIVERS, MICHIGAN

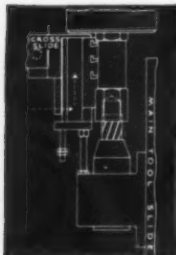
INCENDIARY BOMB NOSE COMPLETED On 2" Greenlee 6-Spindle Automatics



A STREAMLINED SET-UP STEPS UP PRODUCTION AT BATAVIA METAL PRODUCTS CO.



An up-to-the-minute screw machine department, complete in itself . . . inspection booth, tool room, packaging and shipping space, neatly arranged around a battery of 10 Greenlee 6-Spindle Automatics . . . saves time and speeds production of vital war parts at Batavia Metal Products Company, Batavia, Illinois. A unique inspection system, with red stop lights for each machine, affords quick control over operations. A conveyor belt, installed in front of machine line, transfers completed parts to inspection booth at rear. The Greenlees, of 2" capacity, complete the chemical warfare bomb nose part in fourteen operations from 1-21/32" S.A.E. X-1113 hex. stock at gross rate of 39 seconds per piece.



GREENLEE FORM-TURNING ATTACHMENT SIMPLIFIES PROCESSING OF BOMB NOSE

Greenlee form-turning attachment avoids wide plunge cutting of stock. As illustrated, cross-slide feeds narrow tools to depth. Main tool-slide then contacts attachment, turning a uniform diameter lengthwise on piece. This Greenlee feature, also, offers unusual production advantages on many other parts—may be used in five positions. Write today for more facts on Greenlee Automatics.



GREENLEE BROS. & CO.
1842 MASON AVE., ROCKFORD, ILL.



GREENLEE

MULTIPLE SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

Abrasive G-P DIAMOND TOOL KIT

ABRASIVE DRESSING TOOL CO.
DETROIT, MICHIGAN
MADE IN THE U.S.A.

AT LONG LAST!

Diamond Tools for every purpose in a
HANDY, THRIFTY KIT!



Here's What You Get!

- ⊗ 1 Abrasive diamond tool with 2.5 carats of diamonds for straight dressing wheels up to 20" x 1 1/2"
- ⊗ 1 Abrasive diamond tool with 30 carats of diamonds for straight or form dressing up to 12" x 1"
- ⊗ 1 Abrasive diamond tool with 60 carats of diamonds for straight or form dressing up to 20" x 2"
- ⊗ Abrasive chisel-type diamond tool for all sizes of radii.
- ⊗ 1 Abrasive Red Band with diamond at 65° included angle for 0.020 radius and larger.
- ⊗ 1 Abrasive Red Band with diamond at 85° included angle for 0.025 radius and larger.
- ⊗ 3 Abrasive Phonopoints for 0.015 radius and larger.
- ⊗ 1 Abrasive Diamond Scriber.
- ⊗ 2 Abrasive Tool Holders.
- ⊗ 3 Sturdy Keys.

Important: If your supply house has not yet stocked this G-P Kit, have them place your order . . . or place your own order direct for IMMEDIATE DELIVERY!

DISTRIBUTOR TERRITORIES OPEN—WRITE FOR DETAILS!

THIRD-GENERATION OF DIAMOND EXPERIENCE

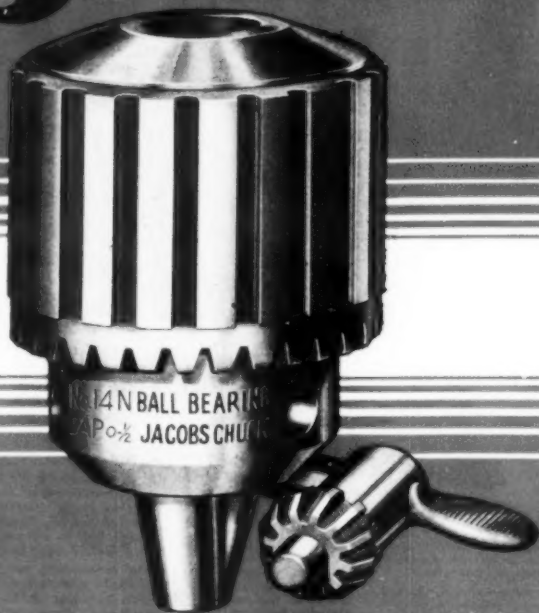
HERE'S YOUR CHANCE to get a matchless assortment of dressing tools, radius tools, cutting tools, phonopoints, a scriber and a pair of sturdy, hand tool-holders—a kit that meets practically ALL shop requirements—at a saving that speaks for itself!

And remember, you get *quality* tools, backed by three generations of diamond experience. The **ABRASIVE RED BAND** of proven performance assures you *better* work, *more* work per set-up. Each kit is numbered for your protection. Place your order. **TODAY!**

Abrasive
DRESSING TOOL COMPANY
Detroit, Michigan

9 improvements
IN THE NEW
SERIES "N"

JACOBS SUPER CHUCK

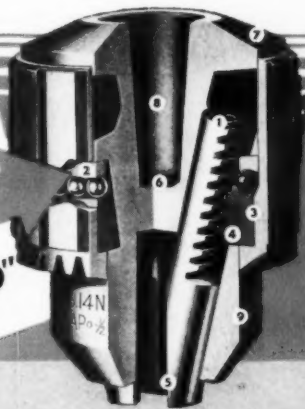


Here is the last word in Chuck design — nine improvements to the already famous Jacobs Super Chuck! Nine improvements to ensure, without question, a firm grip when you need a firm grip . . . to ensure an easy, temper-saving, positive action at all times . . . to ensure maintained accuracy throughout a long life of continuous heavy-duty operations.

Check over the detailed list of improve-

ments tabulated at the right, check over the corresponding details in the cut-away illustration — and see for yourself how each of these well-engineered improvements is in itself a guarantee of "plus quality" in chuck performance. The Jacobs Series "N" Super Chuck is indeed the last word for reliable, heavy-duty, long-term production. Bulletin 31-N gives complete details; write for your copy. The Jacobs Manufacturing Company, Hartford, Connecticut.

**"AN INSERTED
BALL RACE
HAS BEEN ADDED"**



New Features of the Series "N" Super Chuck

1. New design chrome nickel alloy jaws provides 15% more thread in contact than former models. Gives corresponding increase in strength.

5. Harder jaw bites insure longer life.

2. New design heat-treated alloy steel inserted thrust race with continuous deep groove overlaps and eliminates interference with jaw holes. All working surfaces ground.

6. Bottom of taper hole is soft and can be drilled out to make the chuck hollow, if this feature is desired.

3. Ground surface on sleeve centralizes the thrust race insert and closes ball race feeding notch in the nut.

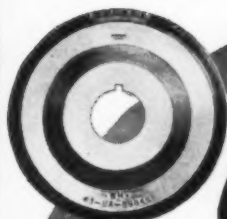
7. Back of body Tocco-hardened to prevent distortion from abuse.

4. Heat-treated alloy steel nut with deep groove ground ball race. Gives four times the load-carrying capacity of former construction.

8. Precision bored taper hole.

9. Nose is Tocco-hardened to resist abuse and prevent distortion of keyholes. Tocco-hardening eliminates warpage of jaw holes, improving accuracy.

**THE NATIONAL
STANDARD
FOR WAR
PRODUCTION**



GRADUATION
MARKINGS?

What's your marking problem?



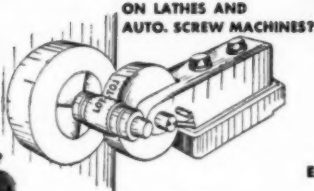
INSPECTOR'S MARKS?



PART
NOS.?



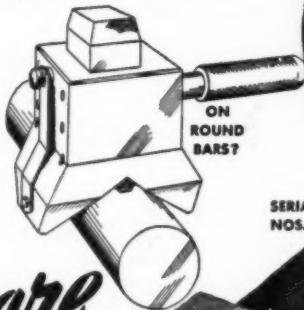
ON
ANNULAR
PARTS?



ON LATHES AND
AUTO. SCREW MACHINES?



ON
PRESSES?



ON
ROUND
BARS?



EMBOSSING?

SERIAL
NOS.?



Chances are

NEW METHOD
has a STANDARD DESIGN
for it. Ask for Catalog!

NEW METHOD STEEL STAMPS INC.

147 JOS. CAMPAU ST.

DETROIT 7, U. S. A.

Barker WRENCHLESS CHUCKS AND VISES



*The Barker Wrenchless
Three-Jaw Chuck.*



*The Barker Wrenchless
Three-Jaw Vise.*



Produce more **AT LOWER COST**

Whether you are on war work or contemplating reconversion, it will pay you to investigate Barker Wrenchless Chucks and Vises.

Ruggedly built for long trouble-free service, easily operated, and low in cost, *they step up output 25% to 75%, or more*, on turners, engine lathes, cutting off machines, drill presses and other types of chucking machines.

Barker Chucks and Vises are made in two types—two-jaw and three-jaw. Write today for the new Bulletin No. 201. It gives complete descriptions and specifications of all types of Barker Wrenchless Chucks and Vises.

THOMAS HOIST CO.

Chuck Division

20 South Hoyne Avenue, Chicago 12, Illinois

A WIEDEMANN TURRET PUNCH PRESS *for EVERY SHORT RUN PIERCING JOB*

SAVINGS IN TIME AND LABOR UP TO 500%

- From 11 to 32 punches and dies at your finger tips
- Every punch and die within 5 seconds of punching position
- Interchangeable die holders where required
- A variety of material positioning gauging arrangements
- A model to pierce templates accurate to $\pm .002"$



Bulletin 101 describes the complete line of Wiedemann Turret Punch Presses from hand operated utility models to 80 ton specialized production machines with gauge tables which save up to 80% on layout and piercing time.



WIEDEMANN MACHINE COMPANY

1831 SEDGLEY AVENUE, PHILADELPHIA 32, PENNSYLVANIA

WIEDEMANN TURRET PUNCH PRESSES & GAUGE TABLES

WESSON VISE

makes **ANY** operator
an **EXPERT**



Difficult angle set-ups can be made quickly . . . in a fraction of the time ordinarily required. Compact size, lowest overall height, ability to work in close quarters, and wide range of capacity permit many adaptations to standard machines . . . you multiply the uses of machine tools with WESSON Vises. Two sizes. See nearest distributor, or write for bulletin. WESSON PRODUCTS CO., 710 Fisher Bldg., Detroit 2, Mich.



THE
WESSON
UNIVERSAL
VISE

Don't let those "manpower blues" get you down when you have precision angle milling to do! Remember . . . WESSON Vises are immediately available. You can get *them* on the job, fast! And any operator can do *expert* precision angle milling, drilling, grinding, reaming, slotting, or what have you . . . with WESSON Universal Vises. Rugged and rigid, free from "chatter," these vises permit high speed precision-production or tool room service, and save time and money.



WESSON PRODUCTS CO., Dept. MT-12
710 Fisher Bldg., Detroit 2, Michigan

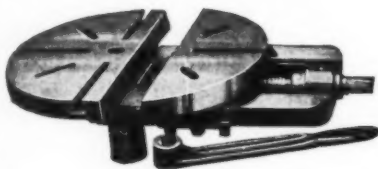
Please send me illustrated bulletin of WESSON Universal VISES and ANGLE PLATES.

Name and Title.....

Firm Name

Address..... City & State.....

Use the COMBINATION DRILL TABLE and VISE



SPEEDS DRILL PRESS SET-UPS

Simplifies the most difficult set-ups. Holds work of all shapes securely, without angle plates, clamps or supports. Just drop in the work and start to drill.

The Combination is made in various sizes — diameters from 8" to 27½", weighing from 27 to 600 lbs. Made of the finest materials, for long life. Easy to install. Specify shank diameter in thousandths of an inch. We supply the drill table and vise with shank turned to size specified.

GUARANTEE

We guarantee the Combination will save its cost in labor alone in six months. You are the judge.

FREE TRIAL

We will ship to rated concerns under this guarantee, on free trial. Should you decide not to keep the tool we will even pay return transportation. Order Today!

Circular on Request.



WRITE TODAY FOR CIRCULAR

Gives full information and illustrates typical, set-ups. Shows use on radial drills. Complete specifications of all models including the square, all steel tables.

MODERN MACHINE TOOL CO.
Jackson, Michigan



WHEN EVERY MINUTE COUNTS

MARSHALLTOWN

PRESSES

**KEEP UP PEAK
PRODUCTION**

Sturdy, dependable Marshalltown Presses offer you THE MOST FOR YOUR MONEY — they are engineered and built for BETTER PRODUCTION and LONGER LIFE. Among many proven advantages are (1) more die space; (2) chrome nickel cranks; and (3) wrist pin connections. The Marshalltown Line includes inclinable presses from 5 to 70 ton capacity



*No. 5
Fly
Wheel
Type*

*Get the FACTS today about
Marshalltown Presses. Send
for fully illustrated and de-
scriptive literature.*

MARSHALLTOWN MFG. CO.
900 E. NEVADA ST., MARSHALLTOWN, IOWA



with
**CHROME CARBIDE
GAGES**

The Griffin Process gives precision thread gage users a new kind of performance!

GRIFFIN PROCESS lengthens gage life 20 times—and even more—depending upon material being gaged.

GRIFFIN PROCESS salvages old and worn gages or can be used for manufacturing entirely new gages.

GRIFFIN PROCESS is now used on thread plug gages of $\frac{3}{8}$ " or larger and on thread ring gages of $\frac{7}{8}$ " or larger.

GRIFFIN PROCESS IS ECONOMICAL— $\frac{1}{2}$ the cost of tool steel gages on basis of extra life and performance.

Let us prove our statements—send your worn gages for chrome carbide processing. Quotations sent immediately. Finest workmanship, prompt deliveries!

WHAT IS THE GRIFFIN PROCESS?


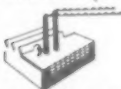
It's a thoroughly proven, carefully developed method for welding a layer of fine grained, tough, wear-resistant **CHROME CARBIDE** to gage blanks. New threads are then ground from the solid and diamond lapped to size. Don't confuse this process with plating... Griffin gages have a thick deposit of chrome carbide extending from the crest of the thread to well below the root. "On size" dimensions are assured for long, hard service because of the extreme wear resistance possessed by this metallic carbide alloy.

GEORGE O. GRIFFIN COMPANY

1307 WEST HADLEY STREET • WHITTIER, CALIFORNIA

Chrome Carbide Thread Gages

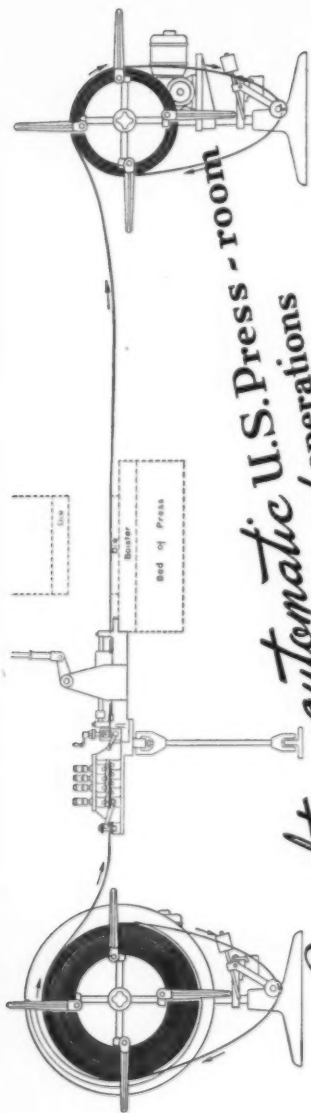
Severance new tool craftsmen regrind worn tools with the same precision and  skill they use in manufacturing new tools. They give each flute the pitch and depth  required to eliminate chatter. They carefully grind each tooth so your renewed tools take deep sharp bites like a new Severance Cutter.  Each tool is

given the Severite heat treat process that increases tooth hardness  and lengthens cutting life 3 to 5 times. It will pay you to send your dull cutters (hand ground, mill or  chisel cut) to Severance for a factory regrind job.

Severance

MIDGET MILLING CUTTERS • PRECISION REGRINDING • Severance Tool Industries Inc., Saginaw, Mich. • Plants in Long Island City 1, N. Y.; Detroit 2, Mich.; Fort Wayne, Ind.; Chicago 6; and Los Angeles 21, California. In Canada: 60 Front Street West, Toronto, Ontario.





*Complete ... automatic U.S. Press - room
Equipment for improved operations*

The above drawing illustrates the ideal setup for metal stamping. It consists of the U. S. Automatic Stock Reels applied in conjunction with U. S. Slide Feed, Roller Check and Stock Straightener. This combination assures high speed, top efficiency and the greatest possible economy. The unit at the left of the drawing illustrates the patented design for the latest U. S. Stock Reel, which features a spiral grooved disc for easily and accurately centralizing the stock.

The new unit to the right in the drawing is a combination of the No. SF-2 Slide Feed, Roller Check and Stock Straightener. The perfect setup for accurately feeding coil stock into punch press dies without the need of pilots. Slide Feeds are available in a range of sizes to accommodate various widths of stock and feed lengths. The feed-accuracy obtained surpasses by far the accuracy of roll feeds, hitch feeds or hand feeding. The Roller Check

(mounted between the Feed and Straightener) consists of a pair of rolls controlled by a one-way clutch, permitting free forward rotation only and positively preventing backward slippage, regardless of tension. The Stock Straightener is fully dependable, with the advantage of anti-friction bearings, crank-operated entering rolls (to start a new coil without disturbing the setting), provision for adjusting each individual roll for the desired straightening action, adjustment of parallelism between all rolls.

Indicated on the right is the U. S. Automatic Stock Reel for rewinding scrap; this is essentially the same as the Reel at the left, except that the Centralizing feature is omitted.

Detailed features of each of these U. S. units are fully illustrated and described in Bulletin No. 50—with complete specifications for these units (also Coil Cradles and Stock Oilers). Write for your copy.

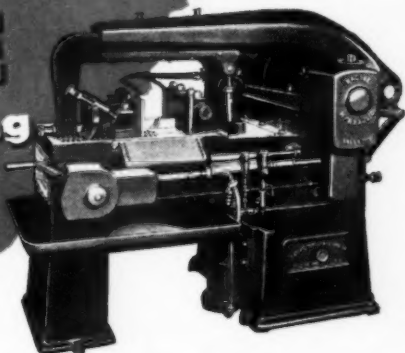
U. S. TOOL COMPANY, INC., AMPERE (East Orange), N. J.

BUILDERS OF U. S. MULTI-SLIDES, U. S. MULTI-MILLERS, U. S. AUTOMATIC PRESS ROOM EQUIPMENT,
U. S. DIE SETS AND ACCESSORIES

THE PRODUCTION SAWS
OF MODERN INDUSTRY

RACINE

metal cutting
saws . . .



Model 30-C—Hydraulic
Production Saw

HYDRAULIC OPERATION

In these Racine Heavy Duty Production Machines, all of the operating functions except reciprocating the saw frame, are accomplished with hydraulic pressure.

This is one of the reasons Racine Machines are fast and accurate. They stand up in heavy duty service with a minimum of maintenance expense.

FOR the past 36 years, Racine has pioneered improvements in the design and productive capacity of metal cutting machines.

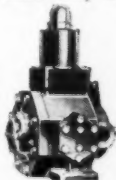
Positive progressive feed, hydraulic operation and control, dual feed and other advances were first used by Racine. These features in Racine Machines assure you high production, accurate work, long blade life; a lower cost per cut.

Racine Machines are available in various models designed for maintenance and tool room work as well as heavy production runs. Cut all classes of material. Capacities range from 6" x 6" to 20" x 20".

Our Catalog No. 12 contains a short summary description of the entire Racine line. May we send you a copy?

RACINE OIL HYDRAULIC PUMPS AND VALVES

Catalog P-10-C outlines all the features of Racine "Variable Volume" Pumps, Valves and Controls. Pumps in capacities of 12-20-30 g.p.m. They operate at 50 to 1000 lbs. p.s.i. Valves from $\frac{3}{8}$ " to $1\frac{1}{4}$ ". Write Dept. MT-s for catalog now.



RACINE

TOOL and MACHINE COMPANY

Standard for Quality and Precision
RACINE, WISCONSIN, U. S. A.



Allison COLLET CHUCKS



Above is Allison Indexing Base mounted with an Allison #1 chuck doing second operation work.

Model #1 for 1½" 8 - thread spindle lathes — with ¾" collet capacity is unsurpassed as a combination chuck for either first or second operation work.

Allison

TOOL & ENGINEERING COMPANY
4031 Whittier Blvd., Los Angeles 23, Calif.

WRITE FOR NEW ALLISON CATALOGUE — SEE YOUR LOCAL DISTRIBUTOR



For your information:
Engineering Data
on
Precision Broaching Tools

*Y*OU will want this Brochure because it contains technical information about broaching tools plus a picture story (in natural color) showing how they are manufactured. If you are planning for post-war production it will more than pay you to send for your free copy today. Please make request on your company stationery.

REMEMBER: Broaching is the fastest metal cutting process that roughs and finishes to precision limits.

U.S. BROACH
Company



6467 E. SEVEN MILE ROAD

DETROIT 12, MICH.

BROACHING TOOL

TELEPHONE TWINBROOK 1-2211

For Smoother Performance



USE ATLANTIC Contour Cutting BAND SAW BLADES

You will welcome Atlantic Band Saws in your shop. The teeth are set to permit a smoother performance for radius cutting. The special alloy steel insures longer wear and you can weld them easily.

IMPROVED PACKAGE

One of the strongest, most practical and convenient boxes on the market. Cutaway feature shows inventory at a glance.

Box is solid chipboard construction that won't come apart. Saw securely held in coil form, no bothersome wires to cut. Required lengths freely removable. Marked on end as well as top of box for easy identification. Packed in all widths $3/32''$ to $1/2''$ wide in 100' lengths. Number of teeth as permitted by W. P. B. ruling.

Send for Atlantic Band Saw Booklet



ATLANTIC SAW MFG. CO., Inc.

Manufacturers of Metal Cutting Band Saw Blades Exclusively
153 Brewery St., New Haven, Conn.

CHICAGO

STEEL PRESS BRAKES—HAND AND POWER BENDING BRAKES—AND DIES FOR ALL STANDARD MODERN PRESS BRAKES



BOX AND PAN BRAKE—

Forms boxes or pans from one piece of metal. A straight brake as well as a box brake. Ideal for experimental shops.

All Chicago Brakes are built of rolled steel welded sections which insures great strength, accuracy and long life.

Up to the minute in design and workmanship, they fit the present need for fast production sheet metal working machinery.

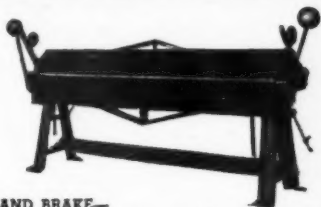
We also build special machines for intricate bending operations.

Take advantage of our experience of over 40 years by sending to us any difficult bending problem you have.



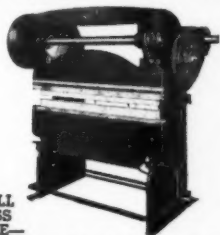
POWER BENDING BRAKE—

Indispensable wherever a volume of heavy plate work is done—forms a great variety of bends and shapes without dies.



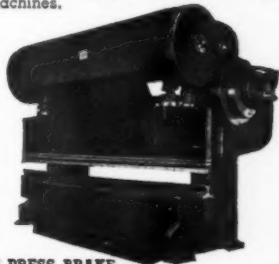
HAND BRAKE—

Improved to meet modern needs. Efficient and dependable—sturdy and durable.



SMALL PRESS BRAKE—

Compact, powerful money-saving production unit. Replaces cumbersome costly machines that are expensive to operate. Uses same dies as larger machines.

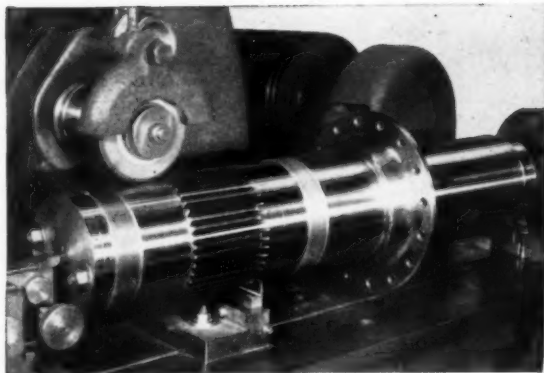


LARGE PRESS BRAKE—

The only press brake which turns out perfect work without shims and crowned dies. Patented non-deflecting bed equalizes pressure over the full bending length and overcomes major fault in solid bed press brakes.

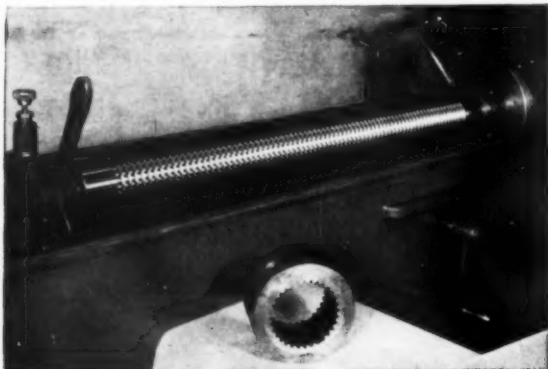
DREIS & KRUMP MANUFACTURING CO.
7440 LOOMIS BLVD., - - - CHICAGO, ILL.
SEND FOR NEW BOOK "FORMING PRESS DIES AND THEIR USES"

Spline Grinding Aircraft Propeller Shaft



"In the Spotlight" for post-war

SPLINE BROACHES UP TO 84 INCHES LONG. Complete Broach Tooling and Engineering Service . . . GAGES, Serration or Spline, male or female . . . Master Gears and Gear Racks . . . Master Index Plates . . . Splined Arbors for gear-grinding . . . Hobbing, Shaving and Checking . . . Production Broaching and Machining. Available from stock, Radius Gages for checking form and hook on broach tooth forms.



**Involute
Spline
Broach and
part of
Wrench
being
Broached for
Aircraft
Engine
Crankshaft.**



GREAT LAKES

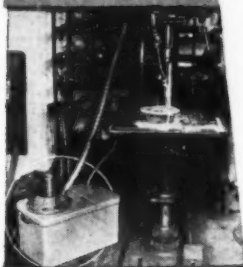
Broach & Gage Company

1005 FRANKLIN STREET

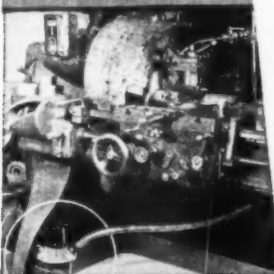
DETROIT 7, MICHIGAN

PINCH-HITTER

PORTABLE TANK COOLANT PUMPS...



Above: Temporary installation
Below: Permanent installation
— Pump Only



Pump capacity: Water and solvents, 300 GPH; light oils, 250 GPH. Units include 6' oil-resisting cable and plug, start and stop switch, 6' of 1/2" flexible oil-resisting hose, valve and nozzle. 16-gal. tank, 30 extra. Extra nozzle, valve, and 12' flexible hose, \$5.50. Pump only, without tank and accessories, \$40.

Simply carry one of these portable CENTRIFUGAL units to any machine requiring coolants, fill tank, plug into ordinary light socket, and begin operations. May be used permanently on any machine. Four multiple nozzles may be used for drill press, etc. Flow of coolant manually controlled by operator from one drop to total. Five gallon, baffled, split-lidded tank of 16-gauge welded steel, 16"x9"x10". May be cleaned without disturbing return piping. Induction, ball-bearing, enclosed motor, 110 volt, one phase, externally fan-cooled.

- Sturdy
- Compact
- Always ready
- Order now

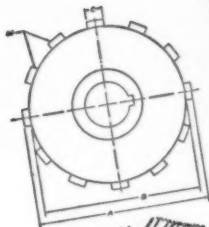
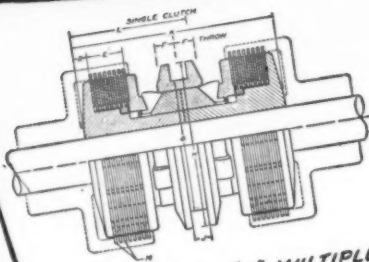
\$67⁵⁰

COMPLETE



BRADY PUMP CO., INC., Muncie, Indiana

A HANSON TRIUMPH... THE MULTIPLE DISC FRICTION CLUTCH



HANSON TYPE "F" MULTIPLE DISC CLUTCH



HANSON Engineers Are Ready To Help You . . .

If you have a clutch problem, in the Hanson line you will find just the clutch to take care of it, and our engineers are ready and willing to help you.

The multiple disc type "F" clutches were designed primarily to meet the demands for high quality, compact clutches of great horse power capacities for the available installation space.

Hanson clutches are fully covered by patents and operate at high speeds without any effect from centrifugal force due to perfect balance.

Why not write us today for complete catalog; or better still, tell us your problem.

The Hanson Clutch and Machinery Co.
BOX H-44
TIFFIN, OHIO

HANSON *Friction Clutches*

for every clutch requirement, regardless of load or drive speed.



PROSSER

Carbide Grinders

These rugged, streamlined grinders are modern in every respect. They are unsurpassed for most rapid rough grinding and finishing of carbides, stellite, high speed steel and other modern tools.

Furnished in bench or floor type, of several capacities, for wet or dry grinding, as desired. Attachments for chip breaker and drill grinding.

A FEW SALIENT FEATURES:

- Quick-acting indexing tables.
- Adequate wet-grinding equipment.
- High Grade ball bearing spindles.
- Oversize wheels, giving longer wheel life, and permitting grinding of larger tools. Moderate price.

Prompt Deliveries
Write for Details

THOMAS PROSSER & SON

120 WALL STREET • NEW YORK 5, N. Y.

SLIP ROLL FORMING MACHINES

**POWER-DRIVEN — NEW TYPE
4" DIAMETER**



Early Deliveries Available

This sturdy former is of the latest improved design ruggedly constructed for heavy-duty service. The slip roll feature makes it easy to remove formed materials from the machine.

The rolls are of tough steel, turned and polished. Bottom and backup rolls have circular grooves for forming work with outside wire edges.

All machines are supplied complete with motor and drum type reversing switches. Sizes range from 38" to 98" roll length and will be furnished with all three rolls power driven if desired.

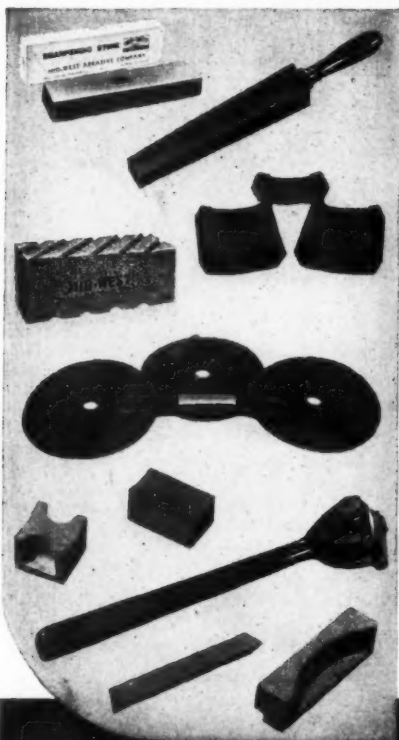
Heavier motor-driven machines are also available either in initial or pyramid type. We can also furnish lighter hand-powered bench and floor type machines. Let us send you descriptive literature.

SAN ANGELO FOUNDRY & MACHINE COMPANY

SAN ANGELO, TEXAS, U. S. A.

"Dealers in Principal Industrial Cities"

HIGH ★ ★ ★ *on the list*



● The superior quality of Mid-West Super-Cut grinding wheels and honing stones, backed by tests conducted under the most rigorous conditions, has placed them ace-high on the purchasing department's "approved list."

! Mid-West's staff of field experts is always available to solve your abrasive problems. And with the speed of delivery assured for every item in our line, the Mid-West Abrasive Company tops the source rating of many a wise buyer.

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Manufacturers of DEPENDABLE Abrasives

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1960 E. Milwaukee, Detroit 11, Mich.

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HOW TO CUT THREADS IN THE NEW

Alloy

Rubber

Aluminum

Plastic

Magnesium

AGE

ARE YOU PLANNING TO USE NEW MATERIALS AFTER THE WAR?

Experimenting in the threading of materials that are new to you can be an expensive, time-wasting process.

Magnesium, aluminum, various plastics, and other materials which are being used more and more widely require individual threading shop practice. The Greenfield Tap and Die Corporation has had wide experience in threading all kinds of materials and is ready to help you select—quickly and efficiently—the proper threading tool and gaging setup for your product.

SIMPLY CALL "THE GREENFIELD MAN"—THROUGH
YOUR GREENFIELD DISTRIBUTOR.



GREENFIELD TAP and DIE CORPORATION · Greenfield, Massachusetts

**FOR FINER
FASTER FINISHING**

Use DREMEL Moto-Tools

Model 2 Moto-Tool, complete with accessories, as illustrated, in felt-lined hard-wood case — \$23.50. Model 2 Moto-Tool only, with emery wheel point — \$16.50.

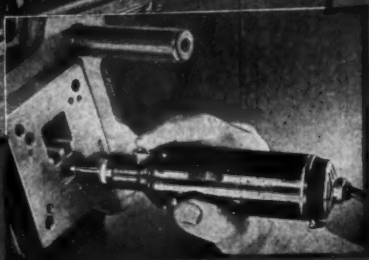
**27,000
R.P.M.**

Used in machine shops and tool rooms for finishing intricate dies. Used on production lines to clean castings, turnings and forgings . . . sharpen tools and do hundreds of grinding, finishing, polishing, marking, reaming and etching operations.

Dremel Moto-Tool has AC-DC motor with shock-proof bakelite housing, oil-cooled (oil-less) bearings, and built-in cooling fan. Weighs only 13 ounces — so light and compact a girl can handle it with ease. Dynamically balanced armature eliminates vibration and provides precision control. Moto-Tool's high speed (27,000 rpm) permits finer, faster work — conserves time.

Dremel Moto-Tools are proving indispensable aids in speeding up war production in such plants as General Electric, Westinghouse, Remington Arms, Ford, Nash-Kelvinator, Consolidated Aircraft.

Whether you have a Moto-Tool or any other type of grinder, use only genuine Dremel shop-tested Accessories — steel cutters, emery wheel points, brushes, sanders.



Douglas and Northrup Aircraft, and many other "Aircrafts."

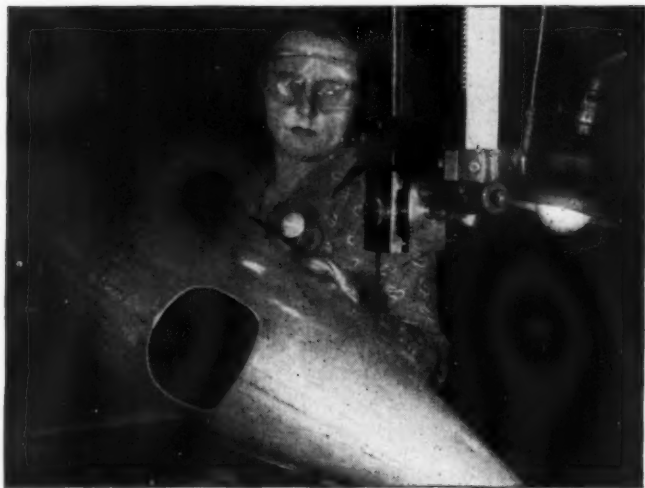
Try a Dremel Moto-Tool on your own job—in your own shop. See how versatile, how indispensable it is—how it saves time and materials. Order from your distributor or contact a Dremel Representative. **PROMPT SHIPMENT** on orders with proper priority.

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Friction Sawing with *Tannewitz* **HIGH SPEED BAND SAWS**

**Trimming formed parts . . . Cutting
Sheet Steel, 1-inch Armor Plate,
Plastics or what have you . . .**



**Write for
Your Copy**

"The process is to some so spectacular that they refuse to believe their own eyes"—so writes the chief tool research engineer for one of the largest aircraft corporations. Previous cutting costs are radically reduced, difficult and slow cutting of certain materials made swift, easy and safe. By all means write for your copy of "FRICTION SAWING" by Arthur A. Schwartz, Chief Tool Research Engineer, Bell Aircraft Corporation which will soon be off the press. It's free.

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WETMORE REAM-MOR BLADES PROCESSED *Cut Reaming Costs*



• For many years it has been the constant policy of Wetmore to design and manufacture tools for better, more efficient reaming.

In this effort Wetmore has developed Ream-Mor Processed blades . . . harder—longer wearing—tough—high speed steel blades with qualities of premium alloys at a cost comparable to ordinary high speed steel blades. Try a set on *your* Wetmore Reamers and see for yourself.

If you have a special reaming problem, Wetmore engineering and experience is at your service.

Send for the New REAM-MOR blade bulletin for complete details.

WETMORE REAMER CO.

414 North 27th Street, Milwaukee 8, Wis.

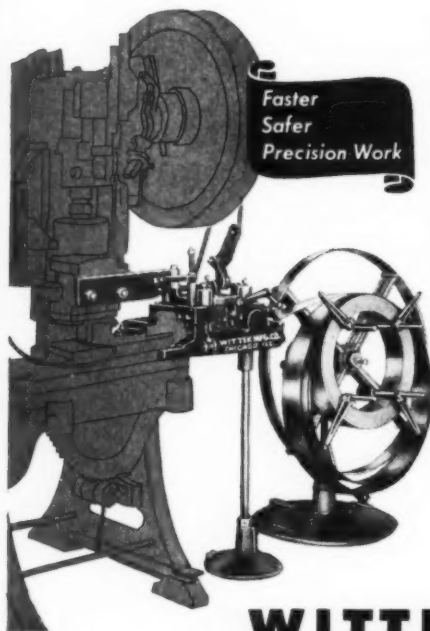


Planning Peacetime Production Using Coiled Strip Stock?

Equip with
WITTEK



Automatic Roll Feeds and Reel Stands



Wittek Roll Feeds are being used extensively by war plants in their large volume production of high quality metal stampings. The flexibility of Wittek Roll Feeds will assist these plants in their peacetime conversion through their adaptability to various jobs. Keen competition will demand the utilization of equipment to its point of highest efficiency. If your postwar plans include punch press production of parts from coiled strip stock—investigate now the many possibilities of Wittek Roll Feeds and Reel Stands.

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recommendations*


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MANUFACTURING CO.

4305-15 West 24th Place, Chicago 23, Ill.

Automatic
**ROLL FEEDS
AND
REEL STANDS**



ACRO



Die set pullers

GONE FOREVER—battered and damaged die sets caused by prying or hammering. **ACRO DIE SET PULLERS** do the job the **FIRST** time. No Delay. Use **ACRO PULLERS** for safe sure separation. They are fast—accurate—positive. War plants using these pullers report savings as high as 50% in time alone.

ACRO PULLERS are indispensable for the grinding, mounting and fitting of punches, enabling the operator to raise punch from die easily, quickly and smoothly, positively holding the set at any desired height.

Order a set today. Convince yourself of the savings you can make in your tool room. **ACRO PULLERS** furnished in three sizes. Write now for more information.

PROMPT DELIVERY

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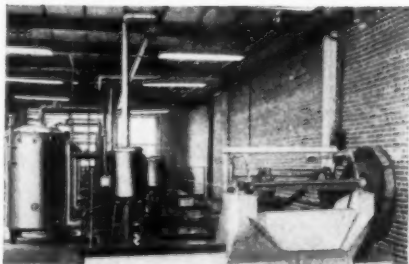
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**WHY DIDN'T WE DO
THIS LONG AGO?**



Once you start filtering your coolant with Hoffman equipment, you, too, will ask yourself, "Why didn't we do this long ago?" Hoffman coolant filtration effects large savings in maintenance, in coolant replacement, in longer life for machines, cutting tools and grinding wheels, and in fewer rejects. These are really worth-while savings that soon pay for the equipment.

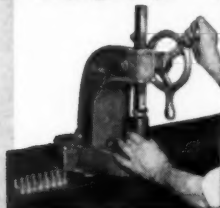
● Illustration shows typical centralized installation, designed to serve a large number of machine tools. Other Hoffman models are available for installation on single machines.



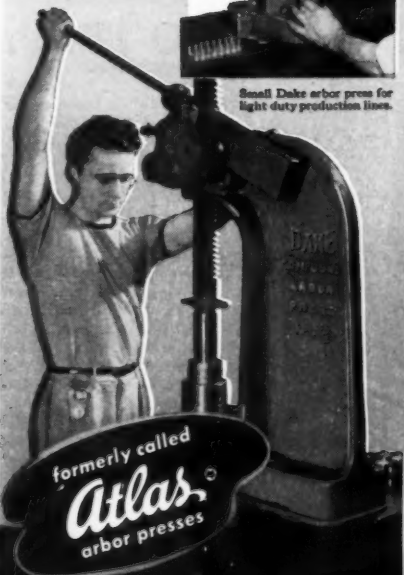
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U. S. HOFFMAN MACHINERY CORPORATION
215 Lamson St., Syracuse, N. Y.
COOLANT FILTERS • FILTRATION ENGINEERING SERVICE

A FAMOUS LINE OF ARBOR PRESSES with a *New name ...*



Small Dake arbor press for light duty production lines.



DAKE

ARBOR PRESSES

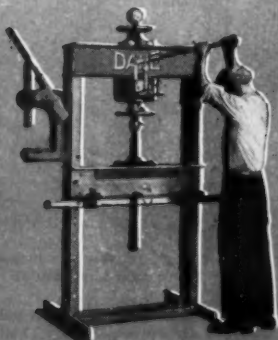
DAKE is an important name in arbor presses...because it stands for an old and established line...ATLAS.

All Dake arbor presses are built to former Atlas specifications. The lever presses have the original Atlas square ram with large bearing surfaces that reduce friction and greatly increase press life.

Dake simple lever presses are made in 7 models up to 5 tons. There are 7 Dake compound lever presses up to 25 tons, and 3 hydraulic presses up to 70 tons. And in the Dake line are several production and straightening presses.

Dake catalog will be sent upon request.

DAKE ENGINE COMPANY
Grand Haven, Michigan

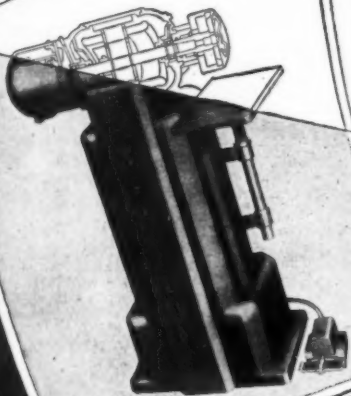


Dake 50-ton hydraulic press for heavy duty service. Extra equipment is available.

3

STARTS A MINUTE!

...DESIGNED TO DO IT...



Lima Magnetic Polishing Lathe Motors are designed for 3 starts a minute... every minute of the day on a twenty-four hour production schedule.

Quick starting, short running and frequent stopping continuously without breakdown, requires a motor specifically designed and engineered for that purpose. It is constructed of the highest grade materials to withstand this severe duty. To give the user of this Lathe the advantages of positive direct drive and brake action, Lima Engineers have employed the motor shaft as the magnetic chuck and brake spindle.

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Lima Magnetic Polishing Lathes, used in polishing, burring or lapping vital automotive and aircraft parts... bearings, etc., must be able to withstand continual production line punishment without hesitation or breakdown.

This new product may point the way to increased production in your plant. Why not investigate its possibilities. A descriptive bulletin describing its operation and application will be sent upon request.



Manufactured by

The LIMA ELECTRIC MOTOR Company

298 FINDLAY ROAD, LIMA, OHIO, U. S. A.

MAGNETIC POLISHING LATHES GEARSHIFT DRIVES PEDESTAL GRINDERS ELECTRIC MOTORS

Improved tapping head

- Better Design Lines
- Increased Output
- More Accurate Work
- Less Tap Breakage



Cross section of Tru-Grip Tap Holder showing positive drive to tap.

The Tru-Grip Tap Holder, for instance, weighs one-third as much as conventional chucks, which kills fly wheel effect and promotes more accurate tapping. The tap holders have small outside diameter $\frac{3}{4}$ " for No. 1, 1" for No. 2, $1\frac{1}{4}$ " for No. 3—which permits use of tapping head in hard-to-get-at spots. Shank is one piece, heat treated and precision ground. Tap is driven by square and held true by the round. Many other features include: Dry, double-cone friction clutch that won't wear and can't absorb oil; makes bot-

tom tapping easy; ball bearings; three point balanced, heat-treated gear reversing mechanism which distributes pull and greatly reduces strain.

EXTERNAL THREADING

Standard Procunier Tapping Heads can be equipped for external threading. Produce accurate work and increase output.

SEND FOR BULLETIN

giving full details, description and prices on complete line of Procunier Precision Tapping Heads to meet all needs. The new Tru-Grip Tap Holder—and also the full line of Procunier Universal Tapping Machines.

Procunier Safety Chuck Co.
14 S. Clinton St., Chicago 3, Ill.

Send me bulletins on () High Speed Tapping Heads, () Tru-Grip Tap Holders, () Universal Tapping Machines.

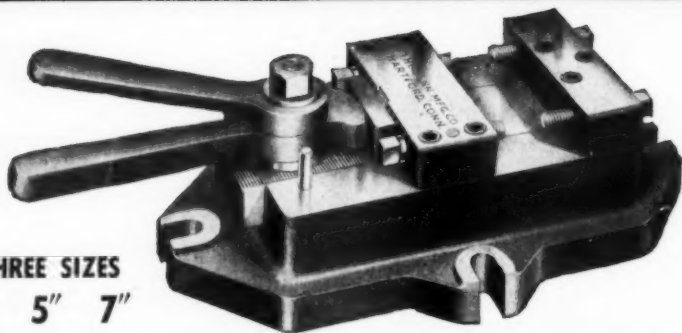
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THREE SIZES
4" 5" 7"

FENN QUICK-ACTION VISE

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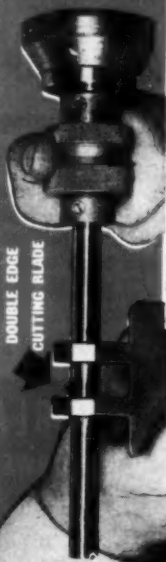
CANADA

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THE FENN MANUFACTURING CO. HARTFORD, CONNECTICUT

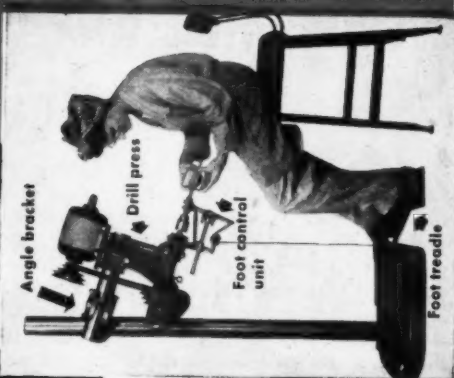
HERE'S HOW TO QUICKLY REMOVE THE BURRS LEFT BY CUTTING TOOLS AROUND THE EDGES OF HOLES ON MACHINED AND SHEET METAL PARTS!

DOUBLE EDGE
CUTTING BLADE



You can remove those sharp jagged burrs **FASTER** with NOBUR than by any other method! Simple and easy to use, NOBUR works like a drill — placed in the spindle of any machine tool, boring may be done by unskilled help with complete ease and safety — and as rapidly as parts can be handled. NOBUR eliminates slow, costly hand work. The double-edged cutting blade is of high speed steel and cuts freely in either alloy steels or soft metals.

Write for the complete story of boring this new, faster way — NOW!

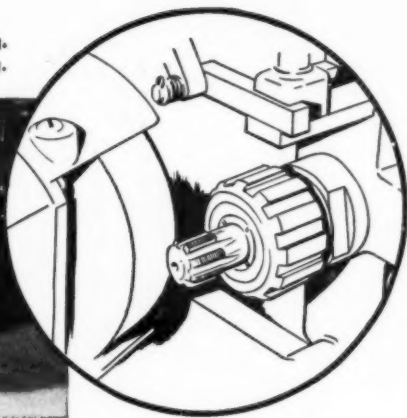
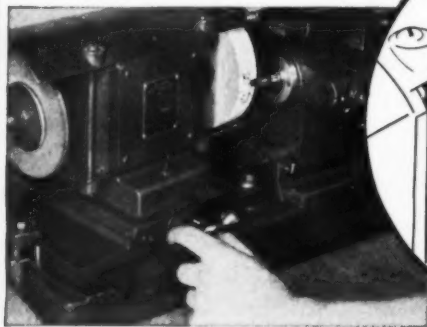


New Nobur foot control greatly speeds Nobur-ing! Quickly installed on any popular type of drill press, this inexpensive accessory leaves both hands for rapid handling of work. The mounting bracket provides adjustable positioning of spindle to operator's best working position.



NOBUR MANUFACTURING COMPANY
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Model No. 1 for taps up to 6" long.
Model No. 2 for taps up to 14" long.



WORN TAPS ARE "Quislings"

KEEP TAPS SHARP ON A BLAKE TAP GRINDER

"Quislings" have no place in American manufacturing plants. Dull taps are "Quislings"—and there is one sure way to eliminate the delay and waste which they cause—sharpen taps on the Blake Tap Grinder. This is the best and most economical way to keep taps at top efficiency. The Blake method keeps taps at "original" sharpness, prevents broken taps, prevents spoiled work, reduces power consumption. Both the Model No. 1 and No. 2 will sharpen taps with 2, 3, 4, 5, 6, 8 and 10 flutes, both right- and left-hand. It will pay to get the full information in Bulletin 544—mail the coupon today.

No machine is better than the cutting edge of the tool it uses.

Please send me Bulletin 544 which gives complete details on Blake Tap Grinders. H.

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BLAKE TAP GRINDERS—FILTRE PORTABLE DUST COLLECTORS—AMERICAN TOOL HOLDERS—
BLACK DIAMOND PRECISION DRILL GRINDERS—WALTHAM CUTTER SHARPENERS



Be a
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WIN the coming battle of competition with a **NORGREN LUBRICATOR**. It's sure defense against a drop in air tool performance and production.

Get smooth, power-packed performance from your air tools when running—positive protection against rust and corrosion when idle. Connect the Norgren lubricator into your air lines and it will maintain a protective film of oil on all parts at all times.

Automatic—works only when the tool operates. Sight feed—ends guessing. Simple to install.

Write for complete information today: C. A. Norgren Co., 220 Santa Fe Drive, Denver 9, Colorado.



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MEMO

TO:

Purchasing Agent

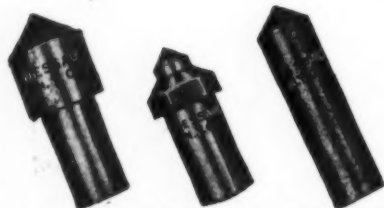
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Diamond Tools

Re-order **DESSAU
DIAMOND
TOOLS**

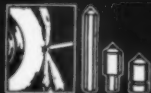
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Immediate Delivery. Write for newest catalogs and
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For over 100 years **DESSAU DIAMOND TOOLS** have been on the "must" purchasing lists of leading industrial plants throughout the country. Why this universal demand? **DESSAU DIAMOND TOOLS** are known to last longer and do a better job. Every diamond must pass a rigid test for hardness, shape and construction before it is approved and set into your specific type of tool. Yes . . . tool supervisors who want perfection **specify "DESSAU"**.



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"Dessau Diamonds True the Wheels of Industry"




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For equipment, materials and supplies, don't forget to . . .

Telephone your  **FIRST!**

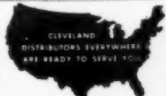


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Drills that are sharp and are correctly ground will (1) drill to exact size (2) drill faster (3) drill more holes per grind (4) drill the same with each lip (5) require less power to drill (6) cost less to regrind (7) reduce percentage of breakage.

Hisey Drill Grinders are designed to grind drills correctly and quickly with inexperienced operators.



**MOST HISEY GRINDERS CAN BE
PURCHASED WITH MRO
PREFERENCE RATING**

Hisey Drill Grinders are made in three sizes to grind drills up to 2½ inch diameter. The larger sizes are made for wet and dry operation and will grind straight or taper shank drills with 2, 3, or 4 lips; flat, chucking or flat twisted drills and drills with oversize shanks. The clearance angle and point angle is adjustable on the two larger size machines.

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Hisey THE HISEY-WOLF MACHINE CO
CINCINNATI, OHIO



From the day of their introduction to industry, gages of Stellite Cast Alloy by Woodworth have been earmarked for leadership. Today these tough, highly wear-resistant gages have attained leadership . . . through superiority *proved* in the service of industry.

Gages of Stellite Cast Alloy by Woodworth have a service life many times that of steel . . . gage life is

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Gages of Stellite Cast Alloy by Woodworth will remain accurate much longer than those made from any of 18 other materials tested.

Write for descriptive Folder No. 44-S.

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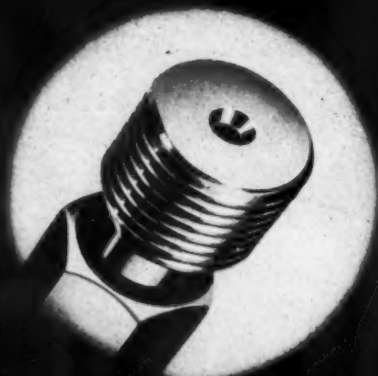
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N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD • DETROIT 20, MICHIGAN

PRECISION GAGES • PRECISION MACHINED PARTS

CADILLAC

Stellite THREAD PLUG GAGES



REDUCE GAGING COSTS 50 to 80%

ALL STANDARD SIZES
from No. 5 (.125") to 1.5"
—Specials to 15"

In the inspection of mass production parts, Cadillac STELLITE Gages have demonstrated that they outwear steel gages several times over, reducing gaging costs from 50% to 80%.

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If you have a quantity inspection job that keeps you busy buying steel gages, change over to Cadillac STELLITE Gages. They will reduce your gaging costs to a fraction of what they have been heretofore.



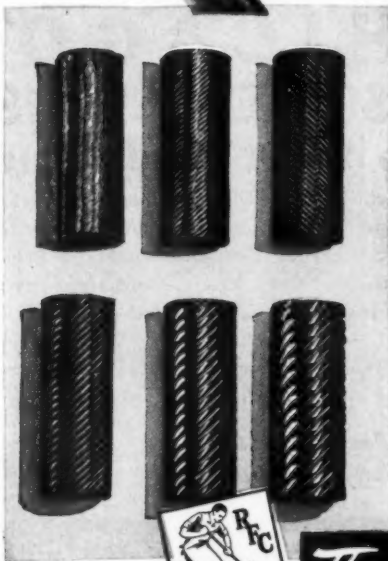
CADILLAC GAGE COMPANY
20316 Hoover Rd., Detroit 5, Mich.



TEETH . . . *and a bite!*

By the cut of its teeth it may seem gentle as a kitten's tongue—or tough enough to chew nails. But any user will tell you:

An RFC HAND-CUT ROTARY FILE . . . correctly chosen for its intended task . . . turns out the fast precision job that both helps cut production time to the minimum and insures highest quality of work.



It takes more than teeth. Each RFC file is right in balance . . . concentricity (shank straightness) . . . tooth form . . . degree of hardness . . . accurate shape and size. Made that way by the rotary file pioneers . . . specialists who during 20 years have perfected the design and manufacture of rotary files for every conceivable use on practically any metal (and other materials).

A wide assortment of standard RFC rotary file types, in high speed steel and high carbon steel. Pays to know them. Write for catalog.



**The ROTARY
FILE COMPANY**
STRATFORD, CONN.

WHY GAMBLE?



CHICAGO "SAFETY PLUS" SOCKET SCREWS are accurate to the Nth degree

When purchasing socket screws, why gamble with products of inferior quality? Since 1872, the name Chicago Screw Company has meant precision and quality. Our complete Chicago "Safety Plus" line of Socket Screw Products are not only accurate, but they are tough and strong. Constant supervision by our metallurgical laboratory insures the strength and toughness of these fine products.

This great line includes Socket Head Cap Screws, Socket Set Screws, Socket Pipe Plugs, Socket Stripper Bolts and Square Head Set Screws.



*These Fine Products are sold
only thru Authorized Distributors*

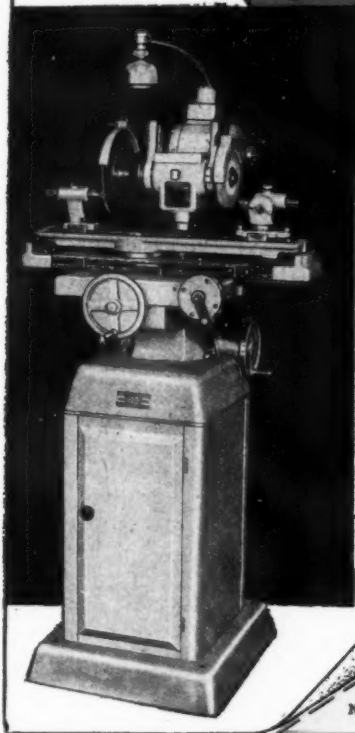


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ESTABLISHED 1872

1026 SO. HOMAN AVENUE CHICAGO 24, ILL.

Model B660
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UNIVERSAL TOOL GRINDER
 NINE OPERATING SPEEDS
 1,100 to 11,000 R.P.M.



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For *ANY* Tension Tightening PROBLEM MOSSBERG'S the Answer:

Besides making a full line of standard wrenches, for torque tightening Apco Mossberg is constantly developing special Torque Tools.

LIGHTWEIGHT TORQUE TOOLS

Recently added to Mossberg's ever-growing regular line of torque wrenches, the lightweight tool meets the need for a wrench to give accurate readings of the low torque required in delicate

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Now made in 4 calibration ranges, Apco Mossberg's wrench to meet high torque tightening needs provides rigid, protected dials with wider, more easily read graduations. Ranges: 0-250, 0-600,

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NEW PALM REST TYPE

To meet the need for a wrench to install spark plugs without breaking bushings, Apco Mossberg has developed a palm rest type which keeps the wrench properly balanced while measuring the torque. Better than a T-shaped wrench, which has a "push and pull" motion,

this new Mossberg tool is pulled by only one hand and is balanced by the other. Also used by Pratt & Whitney for original assembly, this wrench has been found to eliminate breakage during overhaul and over-tightening during installation.

For the answer to your tension tightening problems — write to Apco Mossberg

APCO MOSSBERG COMPANY

165 LAMB STREET, ATTLEBORO, MASSACHUSETTS, U. S. A.

What is Your



Here's a Challenge!*

Try your hand at this brief Grinding Wheel QUIZ and find out your A. Q. (Abrasive Quotient).

Grinding Wheel Quiz

- * Question 1. Why is the modern grinding wheel partially responsible for today's high standard of living?
- Question 2. May grinding wheels be identified by their color?
- Question 3. How does a grinding wheel sharpen itself as it works?
- Question 4. What is the weight of a vitrified aluminum oxide wheel measuring 8" in diameter by 2 1/4" thick?
- Question 5. What is Green Electroton?
- Question 6. How are standard abrasive grain sizes determined?

Answers

1. Because, as a cutting tool, the grinding wheel has made possible much low-cost mass production of mechanical parts.
2. Yes. For example, Abrasive Company's Borden Vitrified wheels in "K" Bond are blue. SB Borden Vitrified wheels for regular tool and cutter grinding are red.
3. The grains on the wheel's surface are broken or pulled out under stress of work as they become dulled, thus continually presenting new, sharp cutting points.
4. Eleven pounds—as shown in the table on page 106 of the Abrasive Company Grinding Wheel Data Book.
5. Green Electroton is a special type of silicon carbide suitable for grinding materials of exceptional hardness, such as tungsten and tantalum carbide.
6. By the number of openings per linear inch in the screens or sieves through which the abrasive grain is passed.
- If you answered more than 3 you're not only very good, but you must have been reading Abrasive Company's Grinding Wheel Data Book!

These and many other interesting facts are to be found in Abrasive Company's 120-page Grinding Wheel Data Book. It's handy, authentic, illustrated!

It's also
YOURS

FREE upon request, while the supply holds out.



COMMANDING QUALITY . . . OUTSTANDING RESULTS



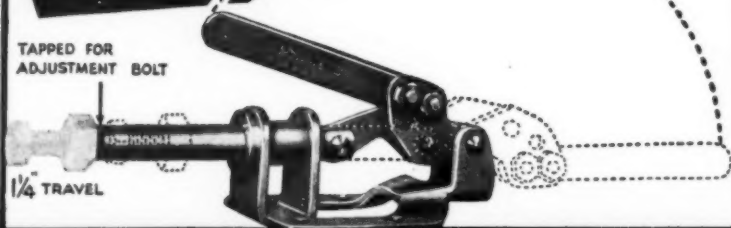
ABRASIVE COMPANY

DIVISION OF SIMONDS SAW AND STEEL CO.

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Especially well suited for locating and indexing, fills a definite need on many jigs and fixtures. Work end (plunger rod) is tapped to receive standard bolt, which provides quick adjustment to suit the job at hand. Quickly converted from "push" to "pull" action or vice versa.



Bulletin No. 43 details this and many other labor saving De-Sta-Co toggle action clamps. Send for your copy.

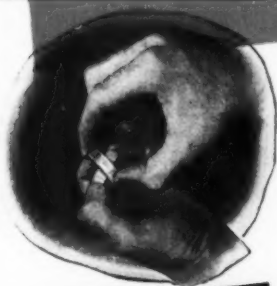
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Established Over 25 Years
≡ 347 Midland Ave • Detroit 3, Mich. ≡

IS A *Plane* SURFACE POSSIBLE?

9.00 mm Fonda Gage Block No. 098

Tv 101734

1 division = one-millionth of an inch
 Profilometer reading = 0.3 to 0.4 micro-inch root mean square.



Can it stay true?

• Wring together FONDA gage blocks. No oil or other film is necessary! See how easily they wring... and how strongly they adhere.

The reason? Simply that the "ULTRA-FINISH"—a process exclusive with FONDA—has imparted to the gaging surfaces a smooth flatness (without appreciable peaks), which constitutes the nearest approach to a perfectly plane surface found hitherto in gage blocks.

No peaks to wear off and change the block size...no films to change over-all dimensions of the wrung blocks...

And—a FONDA-developed new STABILIZING process which eliminates growth or shrinkage (at 68°F.), during the entire period of gage block service!

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Prompt Deliveries

FONDA GAGE COMPANY • STAMFORD, CONNECTICUT



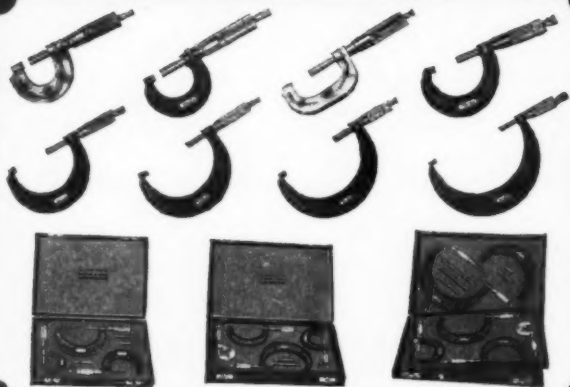
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ALSO FONDA PRECISION GAGES:

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FOR IMMEDIATE DELIVERY!
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• The entire line of individual Micrometers and complete sets illustrated and fully described. Write today to The Central Tool Co., Auburn, Rhode Island.

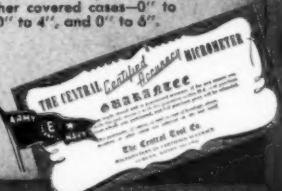
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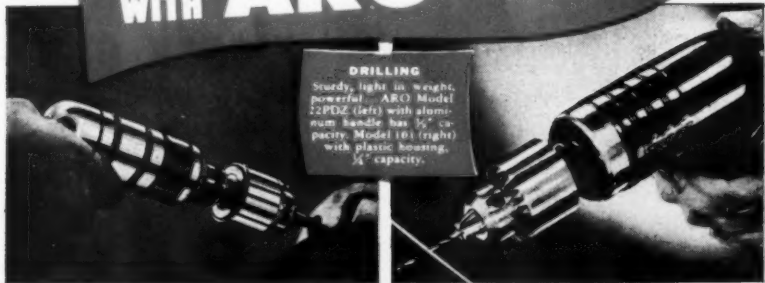
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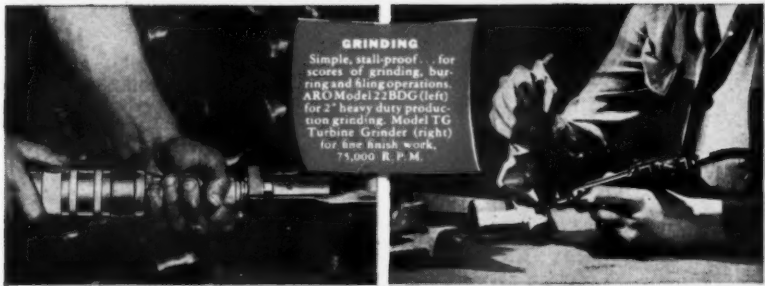
DRILLING

Sturdy, light in weight, powerful — ARO Model 22PDZ (left) with aluminum handle has $\frac{1}{2}$ " capacity. Model 101 (right) with plastic housing, $\frac{3}{4}$ " capacity.



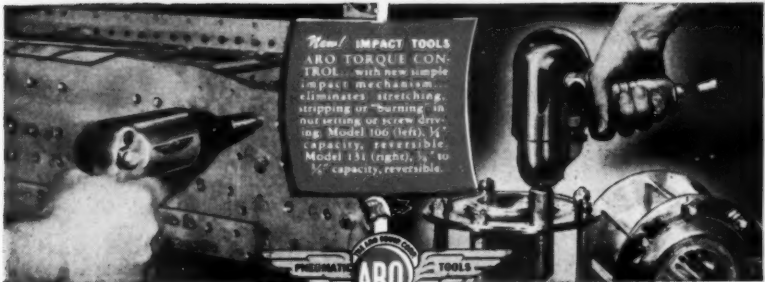
GRINDING

Simple, stall-proof... for scores of grinding, burring and filing operations. ARO Model 22BDG (left) for 2" heavy duty production grinding. Model TG Turbine Grinder (right) for fine finish work, 75,000 R.P.M.



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ARO TORQUE CONTROL... with new simple impact mechanism... eliminates stretching, stripping or "burning" in nut setting or screw driving. Model 106 (left), $\frac{1}{4}$ " capacity, reversible. Model 131 (right), $\frac{1}{2}$ " to $\frac{3}{4}$ " capacity, reversible.



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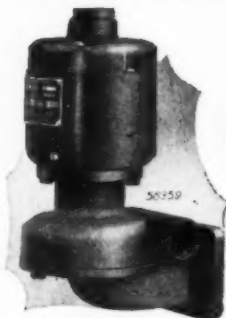
THE ARO EQUIPMENT CORPORATION
BRYAN, OHIO

COOLANT

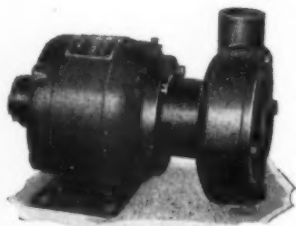
*and
plenty of it*



Sidewall type without seal,
5 to 50 gpm Heads to 19 ft.



Sidewall type with seal, 5 to 60
gpm Heads to 25 ft.



Horizontal type, 5 to 60
gpm Heads to 25 ft.



Immersion type, 5 to 150
gpm Heads to 125 ft.

COOLOANT—in the quantity desired—at the proper pressure—and whenever it is needed. Those are the requirements of a coolant pump.

To meet the requirements 100%, the pump must be engineered to the job and must be absolutely dependable. Careful construction of Ingersoll-Rand pumps assures their dependability. Experienced engineers in every I-R branch office are available to help you select the proper pump for your job. They will check your conditions carefully and recommend an efficient, dependable and adequate pump. Ingersoll-Rand Company, 11 Broadway, New York 4, N. Y.

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HANSEN

Couplings

**PACE PRODUCTION IN THE
GREAT LOCKHEED PLANT**

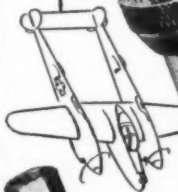
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Hansen couplings used throughout the Lockheed plant are a very important factor in piling up production records on the great Lockheed Lightning and the giant transport Constellation.

Hansen couplings are easy to operate; slight push of plug into socket, coupling is connected, air is automatically turned on. Easy pull on sleeve, coupling is disconnected, air is automatically turned off.

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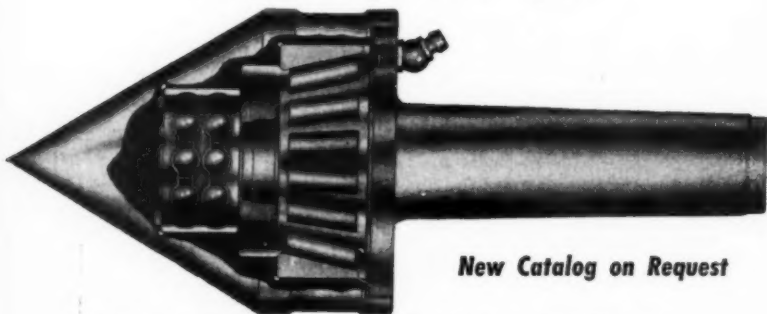
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1786 EAST 27th STREET
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serve you far beyond normal expectancy

because of
these
Quality
features



- ① **Double-sealed New Departure ball bearings** { Keep out abrasive shop dust. The proper type and amount of lubricant is "sealed-in" at the factory for the life of the bearing.
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... and here are the machines themselves **TURN THE PAGE**



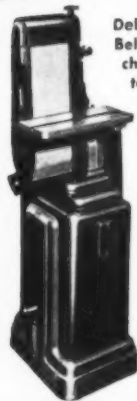
Delta Floor-Type Multiple-Spindle Drill Presses

4-spindle model illustrated. 2-spindle model also available with one-piece table. Floor types with sectional tables: 3-, 4-, 5-, 6-, and 8-spindle.

Delta 14" Floor-Type Drill Press
Delta's patented construction provides *both* a self-aligning drive and a free-floating spindle. Features include smooth-working table-raising mechanism, built-in depth gauge, streamlined safety belt guard.



**Save Time and Money on
with low-cost, dependable**



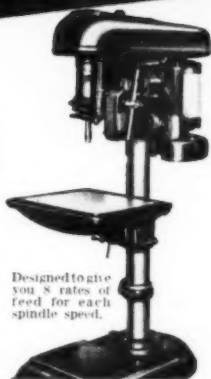
Delta 6" Abrasive Belt Finishing Machine gives you top efficiency

Handles dozens of sanding, polishing, and finishing operations. Set horizontally with wood fence for edge or face sanding, or used vertically in connection with the 7½x14½" tilting table. Completely equipped with double-sealed ball bearings.



Delta 14" Metal-Cutting Band Saw

This low-cost, high-quality machine cuts anything from carbon steel to asbestos — has dozens of uses in the general tool and machine shop, also the pattern shop (4 metal-cutting speeds, 1 wood-cutting speed). Simple, foolproof gear drive. Guides give micrometer accuracy with independent adjustments.

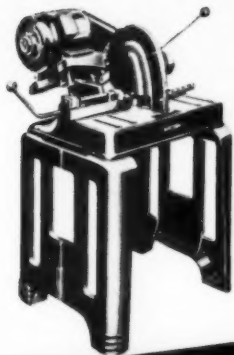


Designed to give you 8 rates of feed for each spindle speed.

Delta Power-Feed Drill Presses

Instant switching from heavy power-feed operations to sensitive hand drilling. Available in 24 different models.

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Delta Cut-Off Machine eliminates expensive finishing. Cuts plastics, non-ferrous metals to exact length with polished smoothness.

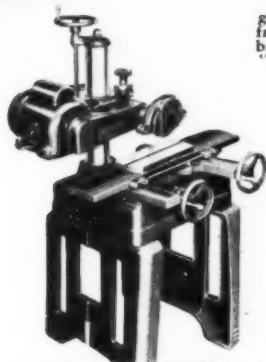


Delta Carbide Tool Grinder Runs True. Free from vibration, for delicate grinding of carbide-tipped tools.



Delta Grinder with Twin-lite Shields gives you extra convenience, efficiency, safety. Safety Shields act as "built-in goggles."

post-war retooling DELTA Machine Tools



Delta Toolmaker Surface Grinder gives dependable, trouble-free results. This husky, big-capacity grinder is a "heck of a lot of machine for the money," say delighted users. Ideal for surface grinding, tool sharpening, etc.

Has many features that assure you creditable performance.

With the Univise and the coolant attachment, it becomes a dependable Chip-Breaker Grinder for grinding the chip-breaker groove on carbide-tipped tools.

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Delta's 76-Page Blue Book gives you 140 case histories of special machines with Delta components

...demonstrating how you can break Reconversion bottlenecks!

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The Quality Tool & Die Company owes any success it enjoys to the ideals and spirit behind that success... ideals of genuine helpfulness in solving the gaging and tooling problems of its customers... ideals that will not allow any

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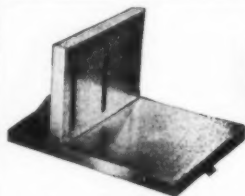
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Manufacturers of "Quality" Products

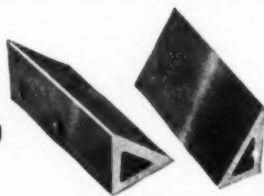
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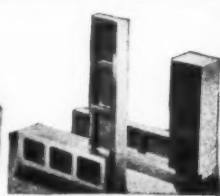
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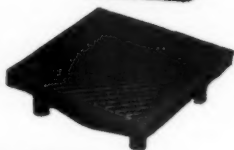
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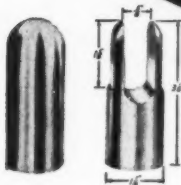
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INCREASE MILLING PRODUCTION without Added Men or Machines!

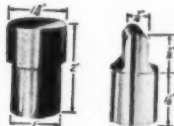


MODEL 10-E
Pat. Applied for



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Aluminum Parts

These aluminum parts were milled upon the Aercro Multi-Grip Chuck at the rate of 355 per hour (floor to floor) as compared with single milling operations of only 71 per hour.



Before After
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These parts, high heat treated of Chrome-moly, were produced at the rate of 62 per hour (floor to floor) on the Aercro Multi-Grip Chuck. Individual milling time was 15 per hour.

These parts milled with the use of the Aercro Multi-Grip Chuck show its versatility.

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Two rows of collets hold ten parts and both rows are milled simultaneously and with but a single loading increasing production as much as 500%.

Self-centering aligning collets insure perfect on-center milling regardless of slight shank diameter variations. Safety stop prevents damage to collets should all stations not be loaded.

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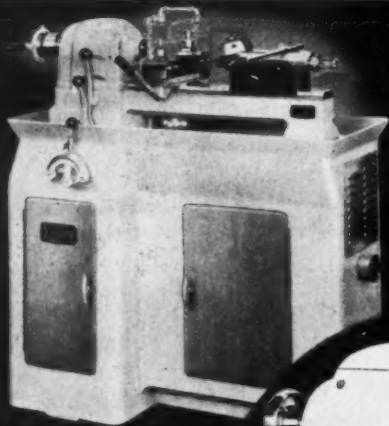
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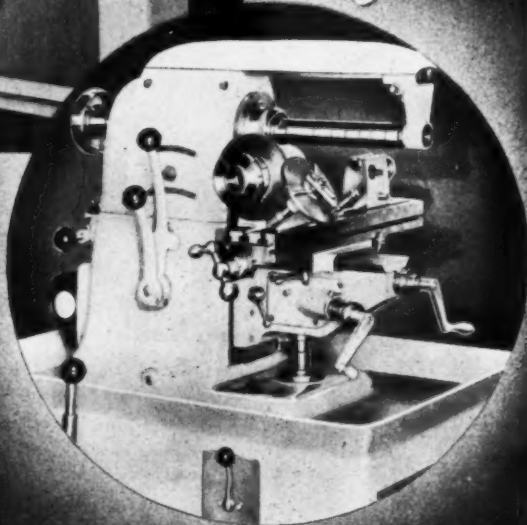


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**PRECISION HAND
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**BENCH
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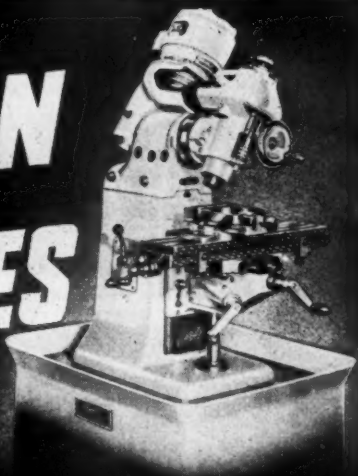
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Elgin precision tools possess mechanical advantages and refinements that permit fast and accurate work to close tolerances plus sturdiness and all-round dependability. Sustained accuracy is assured by adequate design and scrupulous care in construction.

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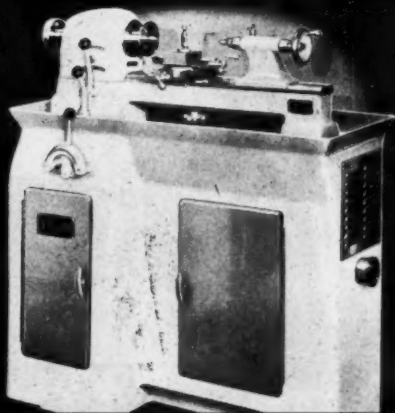
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PRECISION MACHINES



VERTICAL MILLING MACHINE

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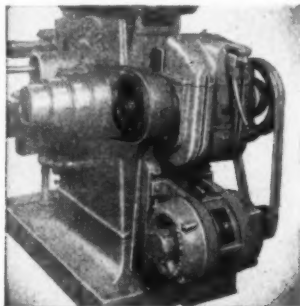
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Speed up! Produce more pieces per hour with Torq-Qua-Matic Transmissions. Combined with Torq Motors, they provide a superbly efficient motorized unit that will modernize your machine tools and bring them up to present and post-war production standards. Lathes, milling machines, screw machines and other standard machine tools are quickly, easily and inexpensively modernized with Torq Motors and Drives.

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CLEVELAND, OHIO

Because They're Small They Have To Be Good

The smaller the grinding wheel, the more critical its quality. Each grain has all the greater responsibility. But small grinding wheels are more difficult to *make* than larger ones—it requires extra care to control consistency of the abrasives throughout each mounted wheel or point and from one to another. Bay State overcomes the difficulty by special manufacturing procedures which result in a better product, easier to use and with longer life.

Each Blue Flash mounted wheel or point is *turned down* from a large blank, and is sized and shaped on its own mandrel. Thus, they

need no breaking-in period, because they are dressed as they are shaped.

run absolutely true, because each is concentric to its mandrel.

have no hard and soft spots, because the consistency of grain and bond is uniform throughout.

can be used right down to the mandrel, because the manufacturing process automatically provides a positive test for adhesion of abrasive to mandrel.

These advantages of Blue Flash Mounted Wheels and Points are typical of what you can expect from the entire Blue Flash line. Into each type of product, Bay State builds *extras* that can be easily appreciated when on the job. Write for literature on the products you use—including the handy, pocket-sized catalog on mounted wheels and points.

BAY STATE ABRASIVE CO.
WESTBORO, MASS.



BLUE FLASH

GRINDING WHEELS

FAST and COOL



GRINDING WHEELS



HONING AND SUPERFINISHING STONES



PORTABLE SNAGGING WHEELS

MOUNTED WHEELS



AND POINTS



CUT-OFF WHEELS



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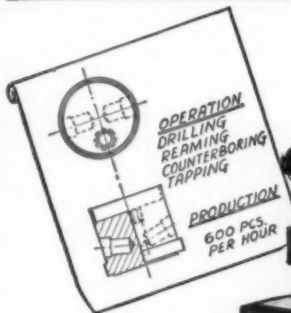


AND CYLINDERS



Avey Automatic

METHOD No. 7

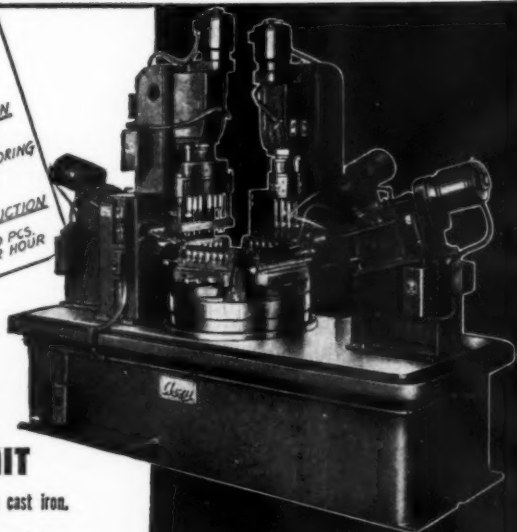


THE *Avey* CAM FEED UNIT

No. 1 Size—1/2" capacity in cast iron.

No. 2 Size—7/8" capacity in cast iron.

Designed for multiple operations on a multiplicity of parts—(clamping six parts at a time)—parts with identical operation at 180°—(index fixture on index table)—drilling, reaming, and tapping.



Accelerated production by multiple fixturing—free loading or indexing while machine is in operation, multiple operations in time required for longest single operation.

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They ALL Need the New
Porter-Cable
BENCH BELT GRINDER

Replaces
Grinding
Wheels
and
Set-Up
Wheels

For FASTER, SMOOTHER Grinding

Because it runs cooler, has a resilient roll that makes line-contact with the work, and uses a movable platen for flats, the Porter-Cable Bench Belt Grinder gives greater all-around efficiency —

AS A CLEAN-UP MACHINE: Alongside the miller, shaper, automatics, or shear it will remove burrs, cutter, or tool marks with speed and smoothness.

IN ASSEMBLY: Knocks off corners, grinds flats, fits, grinds arcs.

IN THE TOOL ROOM: Reduces stock, grinds angles, machines flats, sharpens tools, makes and repairs jigs.

IN THE REPAIR DEPT.: Reclaims oversize parts, corrects machining errors, trues materials, cleans up stock.

IN MAINTENANCE: Repairs, cleans, sharpens, grinds.

BACK STAND IDLER MAKES OVER YOUR OLD EQUIPMENT

Ordinary wheel grinders can be converted to MODERN smooth, cool-cutting belt grinding with the new Porter-Cable Back Stand Idler.

LEARN NOW how the new Porter-Cable Bench Belt Grinder can bring new efficiency, greater production, and cost savings to your various departments. **WRITE FOR DESCRIPTIVE FOLDER.**



PORTER-CABLE MACHINE CO. 300-12 EXCHANGE STREET
SYRACUSE 8, NEW YORK

- **MAXIMUM DEMAGNETIZING with**
- **MINIMUM ENERGY CONSUMPTION**

THE MAG-NO INDUSTRIAL DEMAGNETIZER

IMPROVED SOLENOID TYPE



Model 10

Specifications

Size Overall: 12" High, 17" Long, 4½" Wide.

Bore Clearance: 7" Circular.

Weight: 21 lbs.

Shipping Weight: 25 lbs.

Voltage: 105-120 Volts, 50-60 Cycles. Fuse 5 amperes or 210-240 Volts, 50-60 Cycles. Fuse 2.5 amperes. Specify which voltage is required.

May be wound for special voltages to order, prices on request.

The MAG-NO DEMAGNETIZER has many advantages over surface types since no contact with the tool is required. Eliminates scratching and greatly facilitates demagnetizing on a mass production scale. The MAG-NO cannot be damaged by accidental use of incorrect voltage as it is equipped with a fuse type of cord plug. Fits any standard A.C. receptacle. Any capacity, size or shape may be made to suit your special needs.

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838 BROADWAY

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HOW TO CONVERT A HAND- OPERATED DRILL PRESS TO AN



*Faster - Safer
Better
PRODUCTION*

A BELLOWS Controlled Air-Power Drill Press Feed, synchronized with a Bellows Controlled-Air Vise, brings automatic production to standard drill presses in a matter of minutes.

The Bellows Feed, at the touch of a handle, advances the tool through the work at a precise and exactly controlled rate. The Bellows Air Vise, or a custom-made fixture operated by a Bellows Air Motor, opens and closes automatically with the movement of the spindle. All the operator has to do: *Insert the work — push the handle.*

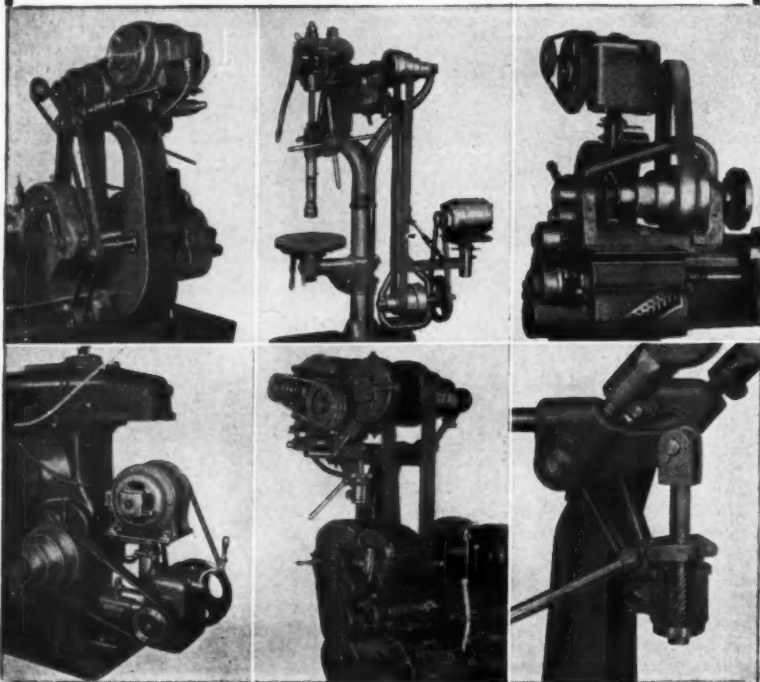
Bellows Controlled Air-Power Devices can quickly convert hand-operated drill presses, millers, grinders, and other machine tools to automatic production units. Not only is production increased by the automatic action, but the reduction in operator physical effort means less fatigue, less shop accident hazard, more uniform quantity and quality of production.

SEND FOR NEW, FREE PHOTO-FACTS FILE — Twenty-five photographs showing interesting applications of Bellows Controlled Air-Power Devices in leading plants all over America — together with a record of production accomplishments, installation costs. Send for your free copy, today.

The Bellows Co.

861 E. TALLMADGE AVE., AKRON 10, OHIO

BERKELEY Drives Cut Production Costs



Production cost will be one of the main worries in the post-war set-up. Labor will be high; competition will be keen and manufacturing efficiency offers the surest way of trimming costs. That means adopting the latest tooling practices and driving your machine tools at speeds that will assure peak output.

There's a Berkeley Drive for practically every size, type and kind of machine tool — designed specifically to fit your tools and to enable them to surpass their best previous performance. Berkeley Drives are rugged and dependable — and soon repay the original cost thru production savings which they make possible.

Put your Drive problems up to Berkeley — no obligation.

BERKELEY EQUIPMENT COMPANY
1022 Bahls St. Danville, Ill.



4 BIG BENEFITS FROM 1 SIMPLE CHANGE★

1. More pieces between grinds
2. More grinds per tool
3. Less down time
4. Lower tool cost

★ **A CHANGE TO TECO CEMENTED CARBIDE** has enabled many plants to substantially step up turning, boring and facing production, while cutting cost per piece and cost per tool. You can do the same in your plant.

MAKE THIS CHANGE! Replace your present carbide tools with TECO Cemented Carbide, on any machine. Run exactly as before—then check the extra pieces produced.

TECO Cemented Carbide has greater resistance to wear and breakage because it is harder, denser, more uniform. Send details of your operation—or have a tool engineer discuss your needs. Catalog and price list on request.

• • •

IMMEDIATE DELIVERY FROM STOCK

can be made on most standard TECO Cemented Carbide tools and blanks.



TUNGSTEN ELECTRIC CORPORATION • 565 39th Street, Union City, N. J.

Branch Office: 2906 Euclid Avenue, Cleveland, Ohio

Representatives: Indianapolis, Ind. Chicago, Ill. Detroit, Mich.

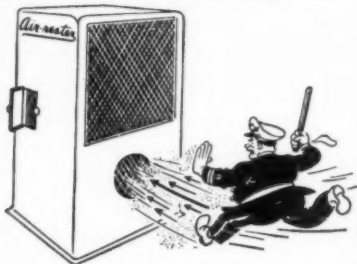


TECO

Pioneers in Tungsten Carbides
for over a Quarter Century



CEMENTED CARBIDE



For Safety's Sake

ARREST THAT DUST!

Yes, you, too, can now efficiently "Air-rest" the dust, grit, etc., from all types of grinders, buffing and polishing machines with a STANDARD "AIR-RESTER." Look to STANDARD for assistance, and you look to the pioneer of today's dust removal—collecting equipment.

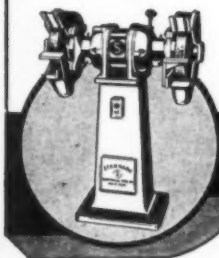
A STANDARD "AIR-RESTER" with its material handling fan costs no more than you pay for dust collectors with air handling fans!

The above photograph shows a 12" grinder with the AR-14 "Air-rester." 4 sizes: 300, 450, 1000 and 1200 C.F.M. The "Air-rester" can be shipped on MRO Rating.

Be on the safe side with an "AIR-RESTER." Write today for complete information.

Manufacturers of STANDARD:

Grinders, Tool Post, Internal, Disc, Carbide, Vertical Spindle, Snagging, etc. 1/4 H.P. to 50 H.P. Buffing and Polishing Machines up to 25 H.P. **Speed Lathes.**



The **STANDARD ELECTRICAL TOOL Co.**

CINCINNATI • 4 • OHIO

2486 RIVER ROAD

For CENTERING
PARTS and SHOTS

MURCHEY

Quickcenter

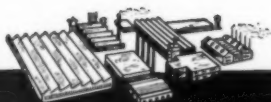
THIS machine is a speedy, easy and accurate performer. It's so easy to use that any workman can handle it. You simply insert one end in the Vee-Block, tighten the hand wheel and advance the center drill—then reverse the bar and center the other end. The **Quickcenter** will do in less than a minute a job that may take over half an hour on a lathe—and do it far more easily and more accurately. The **Quickcenter**, small and compact, increases shop output, uses unskilled operators, saves time and material—and increases your profit.

Write for detailed information to Dept. M-2
MURCHEY MACHINE & TOOL CO.
DETROIT 26, MICH.



{ From 1/2 inch to 3 inch Round Bars }

MURCHEY



THE SOLUTION TO MANY RECONVERSION PROBLEMS LIES IN THIS INTERESTING CONVERSION STORY



Handling a wide variety of work is the job of this 14" Band Saw



This W.T. Drill Press can drill at any point in a circular workpiece.



Five operations are speeded up on this six-spindle Drill Press.



W.T. Drill Presses enable Women Operators to meet high production schedules.



The W.T. Radial Drill is fast, easy to operate, simple to set.

WALKER-TURNER MACHINE TOOLS played an important part in the quick conversion of Horni Signal Manufacturing Corporation from the manufacture of fire alarm and traffic controls to electronic signaling, locating and rectifying equipment. Speedy delivery of Walker-Turner Machine Tools got production rolling months sooner. Their easy, simple operation helped the new workers. Their wide range of operating speeds and flexibility made them ideal for practically all materials. Photographs show applications in the Horni plant.

These Walker-Turner features, plus low price and low operating costs, will enable you to make a quick and successful reconversion.

WALKER-TURNER COMPANY, INC., PLAINFIELD, N. J.



MACHINE TOOLS

DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT-OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

Van Keuren



MICROGAGES

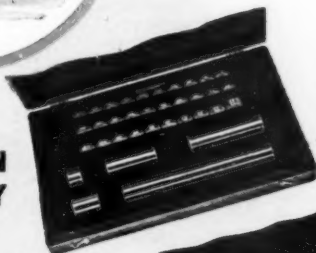
A FOUNDATION FOR ACCURACY FOR 25 YEARS

VAN KEUREN MICROGAGES are high precision working gages, designed for use on all ordinary work and economically practical for use in production because of their low cost. Their great value in general shop use lies in the fact that they enable the workman to achieve the accuracy required by the inspector.

MICROGAGES are of first quality oil hardening alloy tool steel, exceptionally hard, carefully seasoned, with accurately flat and parallel mirror-like surfaces. They combine readily by wringing together and because of their size ($11/16"$ dia.) are ideally suited for checking heights, widths, slots, machine set-ups, gage setting and many other uses. They are made round in order to assure the best distribution of wearing surface, which is about equal to that of rectangular gage blocks.

MICROGAGES up to 1" in length have a tolerance of plus .000015" minus .000010". They average 5 millionths of an inch oversize which provides the WEAR ALLOWANCE feature of these gages.

VAN KEUREN MICROGAGES are available in sets especially designed for general shop use, for gage setting and for toolmakers and machinists. Individual MICROGAGES in standard sizes are also available in a size up to 6" in length.

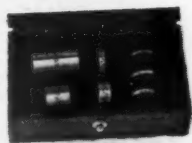


Set MTT MICROGAGES. 35 Gages giving 140,000 combinations \$95.00

Set MT MICROGAGES. Over 5,000 combinations in thousands \$35.00



Toolmakers MICROGAGE SET M64. Gives 121 combinations. \$15.00



Complete details on MICROGAGES and the full line of Van Keuren Precision Measuring Tools are contained in Catalog No. 32, a 144-page manual for toolmakers, machinists and inspectors — sent promptly on request.



THE

Van Keuren

25th YEAR

CO. 175 WALTHAM ST., WATERTOWN, MASS.

Light Wave Equipment—Light Wave Micrometers—Gage Blocks—Taper Insert Plug Gages—Wire Type Plug Gages—Measuring Wires—Thread Measuring Wires—Gear Measuring System—Shop Triangles.

NEW GRAY-MILLS *Portable* PARTS CLEANING SYSTEM

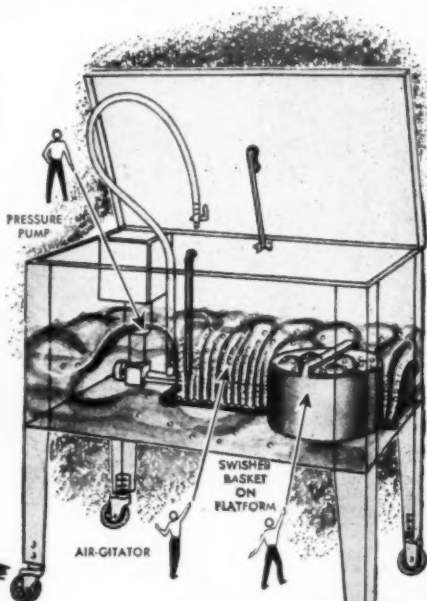
with "Air-gitator" action

**FAST • ECONOMICAL • SAFE
NO LOST PARTS • NEW SOURCE
OF PROFIT • KEEPS TOOLS CLEAN**

Here's a new portable, self-contained parts cleaner, using cold solvent, that offers the low-cost time-saving answer to your parts cleaning problems—eliminates the old inefficient bucket and brush cleaning and makes it unnecessary to heat up large systems for occasional jobs.

Its triple action features provide 3 ways for quick, thorough, efficient and safe cleaning of parts of all kinds, from small machined parts to automobile crankcases. 1—For soak-cleaning the Air-gitator provides a "boiling" action of the solvent which speeds grease and grime removal. 2—Small parts can be easily swished by hand in the unique "swisher" basket. 3—A powerful gear-type pump forces a stream of solvent through the hose for spray-cleaning larger parts and flushing hard-to-clean cavities.

Turn cleaning time into profitable production time with the Gray-Mills Model P-70 Parts Cleaning System. It pays for itself quickly.



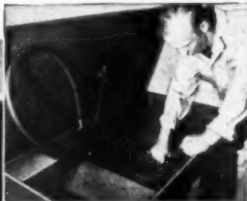
Triple action...
WORKS
3
WAYS

Specifications!

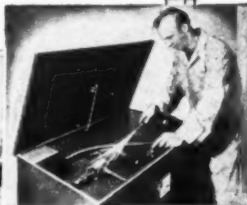
36" High, 21" wide, 36" long



1 "Air-gitator" for soak-cleaning with constant agitation.



2 Swisher Basket and Platform for cleaning of parts in bulk.



3 Pressure Pump for spray cleaning larger parts.

GRAY-MILLS

Send for This Folder
It gives complete information

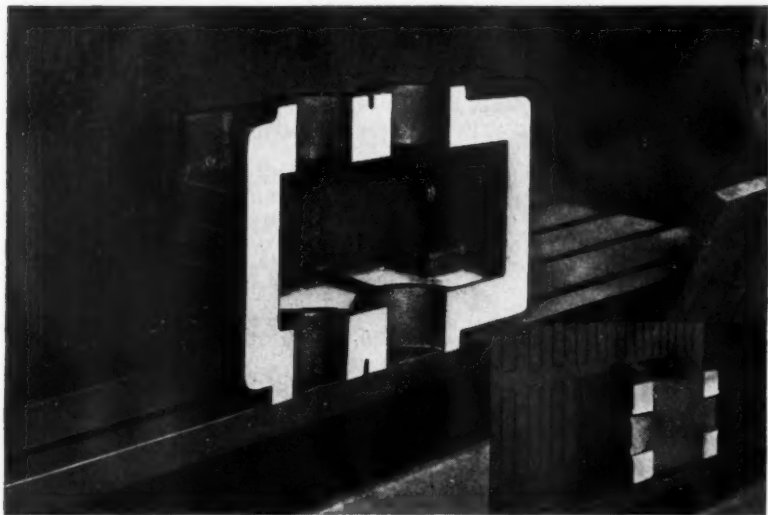


GRAY-MILLS CO.

1945 RIDGE AVENUE • EVANSTON, ILLINOIS

Parts Cleaning Systems • Portable Pumping Units • Fluid Refrigerating Systems • Fractional H. P. Pumps

HOW LONG WOULD IT TAKE YOU TO MACHINE THIS PIECE FLOOR-TO-FLOOR?



Take a good look at this job—a close-grained grey iron gear housing measuring $18\frac{1}{4} \times 14$ ". Has to be faced both sides. Parallelism is important. Bearing side has to form an oil seal. How many minutes do you figure it would take you to machine this piece *floor-to-floor*—60? 70? 80? or more? Now, prepare yourself for a surprise! Facing both sides floor-to-floor with

a Diamond Face Grinder requires just 12 minutes, removing a total of $\frac{5}{8}$ " stock! Piece is held by a magnetic chuck only, without even a bearing on platen while facing feet! Compare the finish and time with any other method of machining then send coupon for the new folder on Diamond Face Grinders . . . today.

Diamond Machine Company of Philadelphia, 2523 Aramingo Avenue, Philadelphia 25, Pa.
Gentlemen: () Send your Bulletin 44-G which shows how to step-up production with the Diamond Face Grinder.
Name _____
Company _____
Address _____ State _____
City _____

"THE DIAMOND



THAT CUTS YOUR COSTS"

DIAMOND
MACHINE COMPANY
OF PHILADELPHIA

Diamond Machine Company, Inc., is a subsidiary of the Diamond Machine Company, Inc., established in 1897, and is a member of the American Machine and Tool Builders Association, Inc., 1200 Market Street, Philadelphia, Pa.

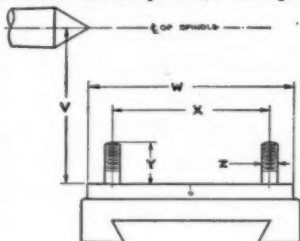
NEW ENCO CR-MODEL REPLACES the COMPOUND

Model CR-7



... FOR GREATER RIGIDITY AND HIGHER ACCURACY

ENCO's new *compound replacement* model gives you the utmost in tool rigidity under high speed production and removes a possible source of chatter and inaccuracy in the compound. Designed especially for engine and bench lathes with low center heights—(the height from the top of the compound rest to center line of spindle). Clamped rigidly on the bolt circle the CR Turret mounts maximum tools and tool holders as shown below.



Range of lathe swings covered is from 9" to 36".

The turret block has 12 indexing positions spaced 30° apart enabling each of the 4 tools mounted in the block to perform more than one operation. A facing tool, for example, may be used for turning by indexing the same tool to next position. This flexibility in use means that standard ground tools, including **angular** tools, may be used without special re-grinding.

Turrets are shipped complete and ready for use and no further machining is necessary.

When ordering please furnish all required dimensions shown on the chart.

LATHE SPECIFICATIONS						
FACE OF LATHE AND SET-UP	V	W	X	Y	Z	TOOLHOLDER OR TOOL, SIZE, NUMBER

MODEL	CR-7	CR-6	CR-4½	CR-3½
MAXIMUM TOOL SIZE	Up to 1¾" tool or No. 4 Tool holder for ½" sq. bit	Up to 1½" tool or No. 2 Tool holder for ¾" sq. bit	Up to ¾" tool or ¾"x¾" Tool holder for ½" sq. bit	Up to ½" Tool
SUGGESTED LATHE SWING	22" to 36"	16" to 24"	13" to 17"	9" to 14"
SIZE OF TURRET BLOCK	4¼" thick 6½" sq.	3" thick 6" square	2¼" thick 4½" sq.	1¾" thick 3½" sq.
SPECIFICATIONS	4 Tool 12 position packed in crate. Shipping Wt. 80 lb. Price \$160.00	4 Tool 12 position packed in crate. Shipping Wt. 50 lb. Price \$129.00	4 Tool 12 position packed in crate. Shipping Wt. 25 lb. Price \$79.50	4 Tool 12 position packed in carton. Shipping Wt. 12 lb. Price \$55.00

**DELIVERY
ONLY
5
DAYS
AFTER
ORDER IS
RECEIVED**

ENCO MANUFACTURING COMPANY, Dept. 29

General Office and Factory:
4522-24 FULLERTON AVE., CHICAGO 39, ILL.

Eastern Sales Office: (Complete stocks carried)
129 CROSBY ST., NEW YORK 19, N. Y.

SELF-indexing CAM-locking Enco Turret Tool Posts



Model
4½-C

ENCO'S new SELF-indexing Turret Tool Post for Bench and Engine lathes adds speedy indexing of the turret block for multiple operations. In addition to 12 position indexing which permits 3 working positions for each tool, ENCO'S CAM locking turret gives you a single-motion, single-handed indexing and locking. This permits the operator to use the other hand for cross-slide movement, tailstock motion, or other simultaneous operations. The fast acting, easily operated cam lever locks the turret block in place after indexing and assures constant accuracy in repeated operations.

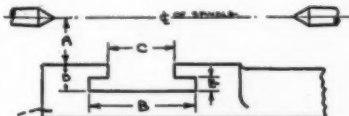
Turning, facing, boring, cutoff, threading and forming tools may be mounted in the turret block of your ENCO Turret Tool Post to speed production on your present engine or bench lathe. Complete job can be set up at once saving valuable lost time on second operation setups. Turret keeps setting accurately. Both models mount standard rectangular or square bit as well as standard cutoff blades and boring bars.

MODEL	4-1/2-C	3-1/2-C
"A" dimension range (from diagram on this page)	1-9/16 to 2-1/2 incl.	1-1/8 to 1-3/4 incl.
Tool Size Range	3/8" to 3/4"	1/4" to 1/2"
Lathe Swing	13" to 16"	10" to 13" and Bench Lathes
Size of Turret Block	2-1/4" thick 4-1/2" square	1-3/4" thick 3-1/2" square
Specifications	4 tool 12 position Mac-It tool post screws	4 tool 12 position
	Packed in carton Ship. Wt. 18 lbs. Price \$64.00	Packed in carton Ship. Wt. 10 lbs. Price \$43.50

IMMEDIATE DELIVERY

on Models 3½-C and 4½-C with machineable base for quick adaption to your lathe.

Better dealers everywhere carry complete stocks of Enco Turret Tool Posts and Enco Tailstock Turrets. However, if your dealer does not carry them, send your order and specifications direct to the Chicago or New York offices listed below, supplying name of regular dealer through whom orders can be filled.



Make of Lathe and Size	A	B	C	D	E	Maximum tool size desired

One-week delivery on ENCO Turret Tool Posts made to specifications. When ordering, furnish all required dimensions and tool size desired and name and address of regular dealer.

ENCO MANUFACTURING COMPANY, Dept. 29

General Office and Factory:

4522-24 FULLERTON AVE., CHICAGO 39, ILL.

Eastern Sales Office: (Complete stocks carried)

129 CROSBY ST., NEW YORK 12, N. Y.

Know the Inside Story of

ROGERS *"Perfect 36"* VERTICAL TURRET MILLS



**Write for
this catalog
TODAY!**

BORING
DRILLING
TURNING

"Perfect 36"

IT'S TOO BIG A STORY

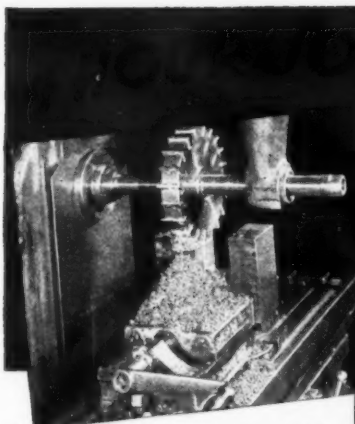
to tell on this page. This fully illustrated catalog will show you and tell you how the 59 years of engineering background in Rogers "Perfect 36" Vertical Turret Mills provide more efficient and economical operations in your plant. Compare the low initial cost, too.

ROGERS MACHINE WORKS, INC.

Sales Offices: 1813 Elmwood Avenue, Buffalo 7, N. Y.

Factory: Alfred, N. Y.

Knowing How Since 1885



DoALL

MILLER versus DoALL

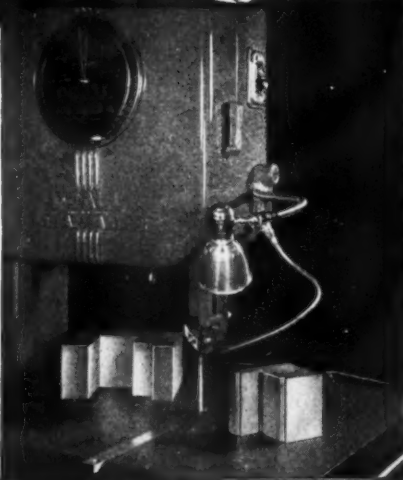
To remove a section from a certain Fixture Block, a No. 40 cutter was placed on a miller and in 4 hours it milled away the section, reducing it to worthless chips.

The same job was done on the DoALL in 1 hour. No set-up time was required. Sides of the cut were smooth and straight and the slug removed was solid, usable metal.

That's the kind of savings that has made DoALL today's most popular method for machining metals, alloys, plastics, laminates and wood.

Handiest machine in any plant — adaptable to internal and external shape cutting in machine shop, foundry, tool room, sheet metal room, experimental or finishing department.

The circular "DoALL Advantages" gives further details about DoALL's superiority. Write for copy.



DoALL

INDUSTRY'S NEW SET OF TOOLS

CONTINENTAL MACHINES, INC.

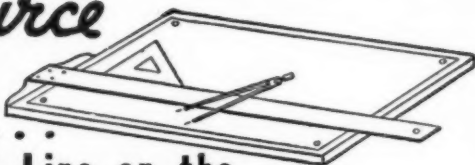
1300 S. Washington Ave.

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Sales & Service Offices: Baltimore, Birmingham, Boston, Chicago, Cincinnati, Cleveland, Denver, Detroit, Erie, Grand Rapids, Hartford, Houston, Indianapolis, Los Angeles, Milwaukee, Minneapolis, New York, Orlando, Philadelphia, Pittsburgh, Providence, Rochester, Rockford, St. Louis, San Francisco, Seattle, Toledo, Tulsa.

A Complete Service at One Source

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From the First Line on the
Drafting Tables to the Finished Product



Whether it is
tools to produce, or the
production itself. We work
from rough idea. Part
print — sketch — or just
talk it over with us. In-
quiries will bring prompt
quotations.

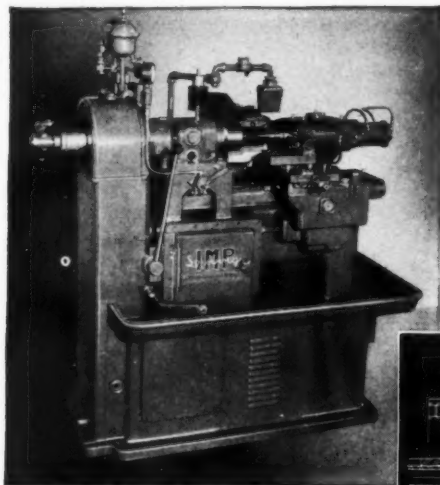
Tools — Dies — Jigs —
Gages — Fixtures — Spe-
cial Machines—Production
of parts in large quantities
— Production of assemblies
from raw material to fin-
ished product. — In addi-
tion to our own equipment
we have ex-
tensive sub-
contract out-
let.



EAGLE TOOL & MACH. CO., INC.
1101 and 1925 W. Main St., SPRINGFIELD, OHIO
ENGINEERING • DESIGNING • DEVELOPMENT

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



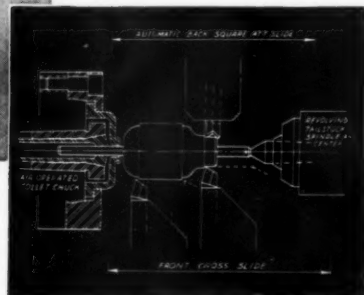
ROTOR AND STARTER COMMUTATORS

Automatically MACHINED
TO HIGH ACCURACY
AND FINISH ON
Lo-swing IMP

PROBLEM: To automatically turn, chamfer and face electric motor rotor and starter commutators, maintaining a fine finish and extremely close tolerances.

SOLUTION: The Lo-swing IMP Lathe with special equipment was selected for this job primarily because of inherent design features which permit high spindle speeds and unusual turning accuracy.

The work is held and driven from one of the ball-bearing seats of the shaft with an air-operated collet chuck. The tailstock end is supported on a revolving center, the movement of which is actuated by an air cylinder. This method of holding and driving the rotor assures the close concentricity which is re-



quired between the bearing seats and the O. D. of the commutator. The operation consists of turning the O. D. of the commutator and rotor, the facing of the shoulder (which is part of the commutator) and the chamfering of the shoulder.

Several other Lo-swing set-ups have been developed for this type of work. We suggest you send in your prints for our estimate.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

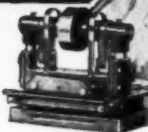
LATHE NEWS *from* SENECA FALLS

METAL Stampings

**DUPLICATED
WITHOUT
DIES**

With DI-ACRO Precision Machines

If you desire to save time and critical materials on production of metal stampings or other small parts, then the DI-ACRO System of "Metal Duplicating Without Dies" merits your consideration. It is based on the rapid and accurate production of formed parts with DI-ACRO Shears, Brakes and Benders. All duplicated work is accurate to .001". These precision machines are adaptable to an endless variety of work, and ideally suited for use by girl operators. For short runs your parts are processed in a matter of hours instead of waiting weeks for dies.



SHEARS



BRAKES



BENDERS

SHEARS

Di-Acro Shear squares and sizes material, cuts strips, makes slits or notches, trims duplicated stampings. Shearing width—Shear No. 1—6". Shear No. 2—9". Shear No. 3—12".

BRAKES

Di-Acro Brake forms non-stock angles, channels or "Vees." Right or left hand operation. Folding widths: Brake No. 1—6". Brake No. 2—12". Brake No. 3—18".

BENDERS

Di-Acro Bender bends angle, channel, rod, tubing, wire, moulding, strip stock, etc. Capacity—Bender No. 1— $\frac{1}{4}$ " round cold rolled steel bar. Bender No. 2 and No. 3— $\frac{1}{2}$ " cold rolled steel bar.

Send for Catalog

"DIE-LESS DUPLICATING"

It illustrates many stampings or parts made without dies, gives full details on DI-ACRO machines and shows how they may readily be adapted for various applications. Request your copy now.



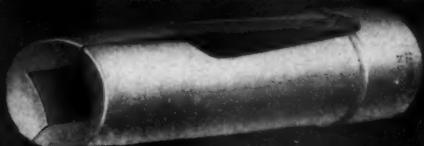
← Pronounced "DIE-ACK-RO"

O'NEIL-IRWIN MFG. CO.

314 Eighth Ave. So.
Minneapolis 15, Minn.



Feeding
Finger
for
Hexagonal Stock



Feeding Finger
for
Square Stock



Feeding Finger
for
Round Stock



Master Feeding Finger
with Interchangeable Pads
of
Steel, Bronze and Cast Iron



Master Feeding Finger
for
Outside
Feeding Attachment

Good Feeding Fingers are ESSENTIAL to Good Output



*We urge buying
through the Distributor*



Brown & Sharpe Feeding Fingers provide reliable feeding of stock for each screw machine job. They are designed so that the working stresses are distributed evenly — and, being constructed of strong, spring tempered steel, they grip the stock firmly and are long wearing.

Catalog listing complete line sent upon request. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

BROWN & SHARPE

PART NUMBERS

LETTERING

GRADUATIONS

ROLLED

BY MACHINE

ON

FLAT & ROUND SURFACES

Sure - Fast - Accurate

OBSOLETE HAND STAMPING

SAVES { PARTS
LABOR
STAMPS

Eliminates POOR MARKING
ERROR — NOISE

Speeds . . DELIVERIES

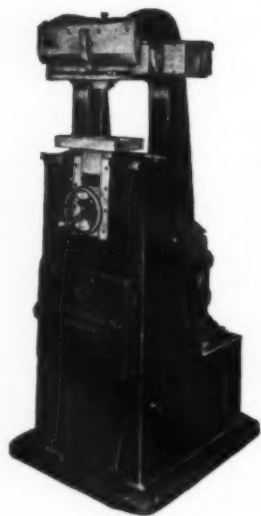
ALSO ADAPTED TO CERTAIN KNURLING OPERATIONS

This Hydraulic Machine will mark piece parts quickly and accurately. It is serving in the war effort in many plants for marking components of guns, tanks, planes, motors, engines, shells, and practically every metal part produced for war equipment. Machine will mark unlimited number of sizes and shapes when equipped with proper tools and fixtures. It will also do an excellent knurling job on solids and shells of small diameters.

Designed and Built By

GEO. T. SCHMIDT, INC.

1802 BELLE PLAINE AVENUE CHICAGO 13, ILLINOIS



MODEL 175

Now . . . A TOTAL OF
1023 ITEMS
IN THE PUTNAM LINE . . . IN STOCK,
READY TO BE SHIPPED IMMEDIATELY



**NEW PUTNAM
STANDARD TOOLS**

- 1** Spline Mill
- 2** Heavy Duty Shell
End Mill
- 3** T-Slot Cutter
- 4** Corner Rounding
End Mill

Tools

THAT CUT FASTER
... LAST LONGER

The addition of new sizes and types of present End Mills, Reamers and Counterbores to provide greater and more complete range, and many new items (a few illustrated above), make today's Putnam standard cutting tool line the greatest in our history. Our new 92-page catalog illustrates and lists every item. Your copy will be sent without obligation if request is made on your company letterhead.



PUTNAM TOOL COMPANY

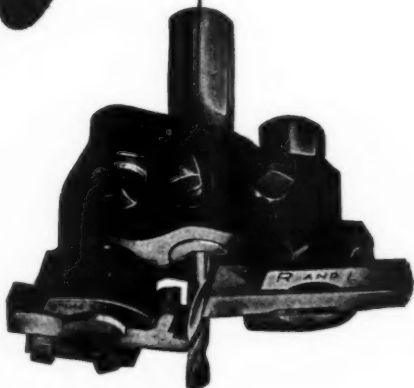
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Detroit 7, Michigan

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Turning Tools



A tool that saves time is a great contribution to the safety of this nation. A tool that saves money is a safeguard against non-profit and loss to your shop. R and L is just such a tool.

Speed is the keynote of this vast defense production schedule. This Turning Tool increases production by reducing set-up time, by speeding up cutting, by doing right and left hand turning (it requires only ten seconds to change from a right to a left hand turning tool), and by performing several operations simultaneously.

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The precision that is built into the Douglas Miller provides efficiency and speed to produce small parts requiring the extreme accuracy essential for today's production.

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Universal Collet Chucks Precision-Built to Fit the job

In addition to the four chucks shown here Universal also manufactures Boring Chucks, Mikro-lok Boring Bars, Grippets, Plungers and a complete line of standard drill bushings. Write today for catalogs on all or any one of these precision made products.

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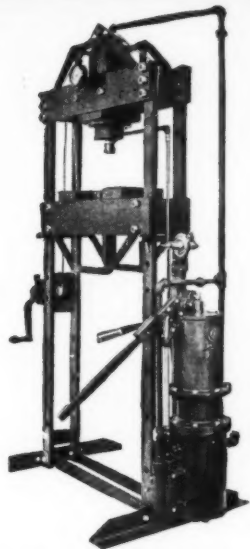


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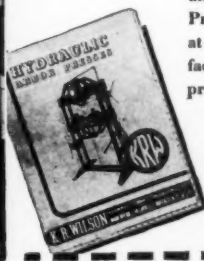
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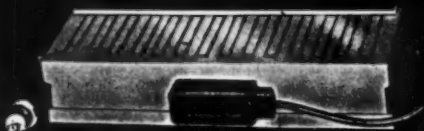
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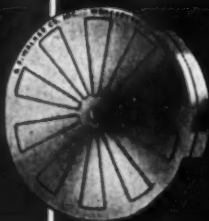


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DURO 18-inch DRILL PRESS

● Here's a new husky low-cost DURO drill press that can handle efficiently a wide range of drilling and tapping jobs—or be easily adapted for many specialized operations.

Has Many Outstanding Features—Special design permits quick changing of belts. Has six-spline telescopic, self-aligning spindle that reduces play. Production table has 14" x 18" machined surface. Efficient production foot feed available. Heavy base with 12" x 12" machined surface. Specifications include: $\frac{3}{4}$ " capacity. No. 2 Morse Paper. 4 New Departure Ball Bearings. Speed range 425 to 2030 R.P.M. Spindle travel—5". Drills to center of 18" circle. Maximum distance from base to spindle—49". Maximum distance from table to spindle—19". Overall height—68". Size of overall base—18" x 28 $\frac{1}{2}$ ". Diameter of column—3 $\frac{1}{2}$ ". Weight of Model A3088 (as illustrated) less motor, 350 lbs. Also available in bench model.



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Infinite spindle speeds: 55 to 1500 RPM, constant speed motor, 1500 RPM
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DIRECT BELT DRIVE AVAILABLE AT HIGH SPEEDS
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INSTANTLY AVAILABLE
THROUGH MULTIPLE DISC
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SPINDLE MOUNTED ON
TAKEN BEARINGS



RIGID—WITH SUFFICIENT
POWER TO TURN AT THE
HIGHEST SPEEDS AND
FEEDS MODERN TOOLS
WILL WITHSTAND



SPINDLE SPEEDS AND
POWER FEED CHANGES
WITHIN EASY REACH OF
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SLIDES AVAILABLE:
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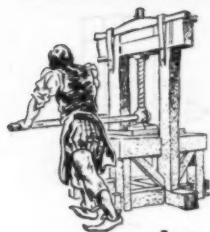
*Combination feed provides
instantaneous selection in
either lever or screw feed.



EIGHT FEED CHANGES
FOR THE UNIVERSAL CAR-
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OR DISENGAGED BY ONE
MOVEMENT OF THE LEVER.



THE DESIGN OF
THE MOREY No.
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BASICALLY ALIKE. EACH
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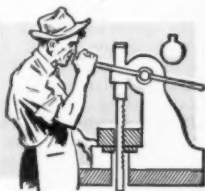


TODAY, countless ships plow fog-shrouded seas, hurrying vital supplies to our fighting men. Swarms of 'planes hum a dirge over the axis homeland. Arid lands are made fertile and productive. Mighty rivers are harnessed to provide power for distant war industries. Propellers — pumps — turbines . . . modern necessities and conveniences without number . . . stem from the unknown genius in whose brain was conceived the principle of the screw. The mists of years obscure his name, yet from Galileo to Gutenberg to Millennium, developments of this basic idea have, and will continue to, profoundly influence our civilization.

IN the same manner that so many complex machines, essential to Man's progress, developed from the fundamental principle of the screw, so too, has broaching developed from crude tools capable of limited uses, to mighty machines capable of performing metal removing operations with speed and precision, in an almost endless variety of shapes and sizes . . . and making them quicker, cheaper and **BETTER!**



The first broaching machines were invariably arbor presses, and were generally used to cut keyways in pulleys and gears.

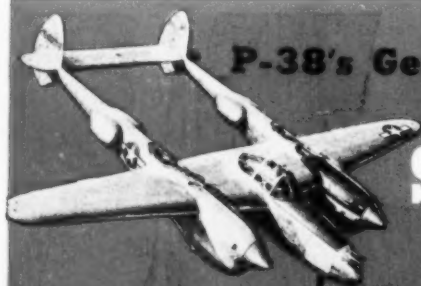


THE LAFORCE

Machine Tool Company

HUDSON, MASSACHUSETTS, U. S. A.

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES



P-38's Get Wings *Sooner* when **SKILSAW** is on the job!



Weber Showcase & Fixture Co., of Los Angeles, sub-contractor to Lockheed, uses SKILSAW Model "825" for fast, accurate skin splitting before applying reinforcing members to leading edge of wing sections for famous P-38's.

● Here's another example of how war production speeds up when smart engineers put SKILSAW to work. Fast, accurate skin splitting was a tough problem at Weber Showcase & Fixture Co.—until Weber Engineers solved it by putting SKILSAW Model "825" into a specially designed jig. Now, wings for P-38's roll off the assembly line faster, because SKILSAW is saving *time and manpower* on an important step in production.

Industry everywhere has found that SKILSAW is a most efficient cutting tool, with or without a jig. SKILSAW is powerful, compact, light in weight, easy to use . . . goes

right to the work, saves steps, saves material handling.

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PLANNING FOR AFTER-THE-WAR?
Let Skil Saw help you now to plan "tooling up" for peacetime production with Skil Saw's new post-war tools.



BLUE BOOK

Presents . .

TOOLING for Hydraulic Valve Production calls for engineering skill of a high order. All down the line, there must be no compromise with precision and accuracy, for leakage is intolerable in hydraulic engineering. Many of these valves are used in plane hydraulic systems—and failure may have tragic results.

Adel Precision Products Corporation recently revealed some of their equipment and methods to Gerald Eldridge Stedman and he tells about them in the story commencing on page139.

COATED ABRASIVE BELTS have contributed a lot to many branches of the war effort. These fast-cutting, versatile abrasive bands will be more widely used in the post-war set-up. Originally used in finishing operations, they're now serving in some instances as regular production tools.

Thomas Trowbridge tells about some of the things that have been done with abrasive belts in the story beginning on page.....167

The advent of **CARBIDE CUTTING TOOLS** was a milestone in machine shop practice. Additionally, development of the new steel cutting carbides and the negative rake technique brought a whole new set of metal cutting performance standards.

A description of these important developments and a hint of what they may mean in machine shops

of the future will be found in the second installment in the series of articles on Metal Cutting on page199.

CHANGING ORGANIZATION FORMS is Arthur Roberts' topic in the current Tax Problem series. He reviews the advantages and disadvantages of changing corporate forms in the story commencing on page217

CYLINDERS, actuated hydraulically or by air pressure are being used in an increasing number of shop applications. John E. Hyler tells about some of these in the story on page.....235.

FOREMANSHIP and its Executive Side is Ed Mottershead's subject in the current offering on page.257.

"LET'S TALK SHOP" presents the regular collection of hints, suggestions and interesting facts in the section starting on page....277.

WHAT'S NEW offers the monthly parade of machines, equipment and methods, starting on page....302.

BOOK CORNER lists the latest publications. See page.....365.

MECHANICS Thru the Ages...410.

LEND IT — TO END IT!

Help Boost the Totals in the Sixth War Loan Drive.

Close Limits and Fine Finish-

FOR EFFICIENT PRODUCTION

Close limits and a fine finish are essential for efficient production on many important metal working operations. Maximum output at minimum cost can be attained only when the methods and machines are such that close tolerances and the best possible finish can be maintained on piece after piece, indefinitely.

It is on this type of work—exacting toolroom jobs or production operations that call for toolroom accuracy—that the high precision and dependable performance of South Bend Lathes pay real dividends. Their smooth operation through a wide range of spindle speeds produces surprisingly fine finishes. In fact, when South Bend Lathes are installed, subsequent finishing operations can often be eliminated.

Today South Bend Lathes are better in every way. Our entire plant is devoted to lathe production—we manufacture no other products. There has been no lowering of standards because of war-time restrictions or shortages and the use of substitute materials is negligible, limited to non-essential parts such as name plates, paint, etc. Improvements have been accelerated to meet war production needs.

South Bend Engine Lathes and Toolroom Lathes are made in five sizes: 9", 10", 13", 14½", and 16" swing. Precision Turret Lathes are available in two sizes: Series 900 having 9" swing with ½" collet capacity, and Series 1000 having 10" swing with 1" collet capacity. Write for Catalog No. 100-C.

BUY WAR BONDS NOW...SAVE FOR LATHES

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POST-WAR PRIORITY PLAN

To those who cannot qualify for a war-time priority, South Bend Lathe Works offers a practical Post-War Priority Plan. You can place your order now for any South Bend Lathe. No deposit or down payment is required. We ask only that the order be placed in good faith. When civilian production is resumed, orders will be filled in the sequence established by the numbers of the Post-War Priority Certificates. Should conditions necessitate, the order may be cancelled at any time. Write now for details of this plan.



AS THE
Editor
SEES IT



HARDLY anything in this world is altogether evil — not even war. Out of the prodigal waste of life and resources, some technical advances may be listed on the credit side.

New metal cutting techniques have been born of the need for faster and greater production of weapons. In the post-war world, some of these improved methods will help to provide more things, at lower prices, for more people.

New steel cutting carbides made it possible to increase production rates far beyond previous practice. Then came adoption of the negative rake technique which pushed former conceptions of metal cutting farther into the background.

The negative rake is no panacea for all cutter troubles. Correctly used in the proper places, negative rakes have helped to solve some tough cutter problems.

In the orthodox practice of cutting metals, so-called positive angles were used for many years. This is best understood by considering a common chisel. Its action is like that of a wedge prying metal from the work piece.

In the new technique, a negative cutter angle combined with high speed, pushes rather than wedges the metal off. The negative back rake increases the wedge strength behind the cutting edge, allowing higher cutting speeds, heavier feeds and deeper cuts.

The greater wedge angle permits increased cutting pressures to be absorbed thru the cutter shank without damage to the cutting edge.

Negative rake cutters tend to shear the metal instead of prying it away as in the case of positive cutters. The higher cutting speeds generally mean better work finish.

On interrupted cuts, negative rakes enable the cutter to absorb severe impacts under direct compressive loads on the carbide. Carbides can withstand heavy compression loads, yet have less strength in tension.

For optimum results, the machine tools must be in good condition. In fact, machines of the future undoubtedly will be more massive to permit full utilization of carbide cutting tool possibilities with still higher speeds and heavier cuts.

Wesley G. Paulson

*Call Ryerson
First*



For Quick Action on Steel

Whether it's fast service, a steady, reliable source, a cutting or fabricating operation that will facilitate your production, or just information and assistance, you're most apt to get what you want by calling Ryerson first!

Ryerson maintains leadership in the steel business by making good every promise, by knowing the kind of service customers want and giving it to them, and above all else, by having in *stock* thousands of kinds, shapes and sizes of steel for immediate shipment.

Stocks are reasonably complete, considering wartime demands; so whatever kind of steel you want, within the WPB plan, *call Ryerson first!*

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RYERSON STEEL-SERVICE

Tooling for HYDRAULIC VALVE PRODUCTION

By GERALD ELDRIDGE STEDMAN

THE Adel midget series of hydraulic selector valves has won deserved engineering favor. They have demonstrated an enviable "weight-service" performance ratio.

This midget series is of three types:— (1) singular, (2) stacking, (3) manifolding units. Their functional spread enables wide use and particular adaptabilities in hydraulic operation of wing flaps, landing gear, gun turrets, bomb bay doors, cowl flaps. The midget series is standardized equipment for most United Nations' war planes. The Adel engineering group is working upon further applications of this series to railway, automotive, household and machine tool installations.

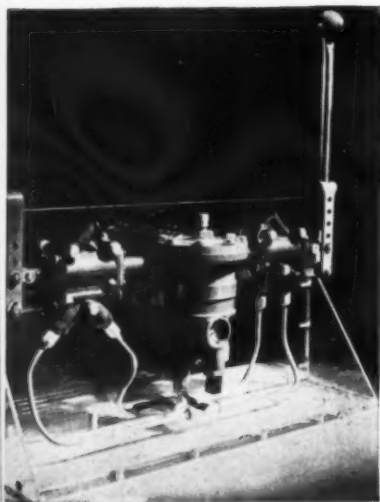
In its singular expression, the "Mighty Midget" selector valve is dimensioned:— $2\frac{1}{4} \times 2\frac{1}{4} \times 1-17/32$ " thick, weighs 0.7 lbs, and involves an assembly of 15 major parts. In function, its capacity is said to have excelled hydraulic valves twice its size. It operates under pressures up to 1500 psi at temperatures -40° to 160° F.

Perhaps the most important part of this typical midget is its hydraulic, 4-way, five gpm insert, referred to herein as the cage part. This is of No. 416 corrosion resistant steel; 90,000 psi, min. 25-30 Rc., temper 1100° F min. One stage of its 16 machining operations involves the use of an ingenious multiple mill and drill machine tool of Adel design and construction.

A PRODUCTION HUDDLE —

Left to right:—Lee Baldwin,
Roy Johnson and Anton
Braun.





Model hook-up of the Adel Iso-draulic master slave system which employs the "Mighty Midget" four-way selector hydraulic valve.

The retainer part, or cage, discussed is illustrated. This cage functions to control hydraulic fluid passage in and out of the cylinder actuated by this valve. The cage has a top and bottom seat in contact with a top and bottom poppet. In association with a coaxial cam, these facilitate two-way hydraulic movement, permitting the midget valve to accomplish functions in one-half the space otherwise required.

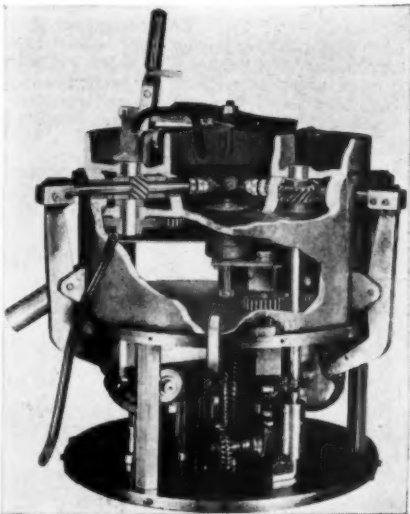
The difference between this Adel poppet valve principle and the usual hydraulic sleeve valve setup, is that the Adel flow is controlled positively to eliminate leakage. The usual sleeve arrangement occasions probability of leak-back. Leakage is intolerable in good hydraulic engineering.

The coaxial poppet design cage involves the principle of one cam operating within another. This requires difficult concentricity and demands closest precision. Adel Precision Products Corporation has an enviable record in war production. This has been established by its accuracy and

design simplicity in much standardized aircraft equipment production at its Burbank, California plant. Its talents are exemplified in the fabrication of this cage.

All cage diameters must be machined to be concentric within .0005", full indicator reading. Any two adjacent, or non-adjacent diameters must be concentric for full indicator runout within $\frac{1}{2}$ average of full tolerance of the two concerned diameters. This requires the most precise dimensioning and careful assembly. (Tho not a concerned subject herein, the Adel tendency is not to submit this cage to the hazard of overburring by hand operations.)

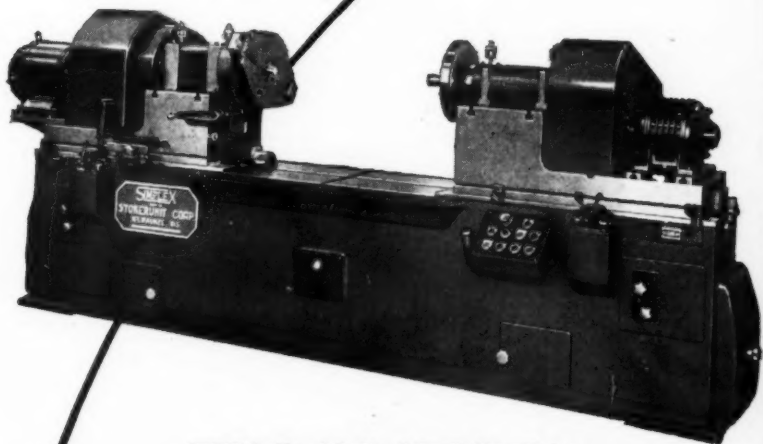
The Adel tooling practice, carrying precision engineering into form, moves from Engineering Design to model, to test, returning to Engineering Design revision, and then to Methods and Standards. (This group comprises tool planning, design and fabrication). Procedure returns to Engineering to gain refinement of recommended changes and then production tooling.



Cut away view of the Adel automatic milling machine.

SIMPLEX

When it became necessary to apply mass production methods to a large, intricate assembly, final finishing operations had to be performed after the assembly unit was completed. The operation was slow and difficult until a SIMPLEX Precision Boring Machine was engineered to do the work. This is another example of the flexibility and versatility of SIMPLEX Precision Boring Machine construction.



SIMPLEX Double-end Precision Boring Machine with extended center bed section, arranged for boring and facing bulky assemblies which required a high degree of parallelism between the faces and a high concentricity between the bores and the opposite ends of the assembly.

Precision Boring Machines

STOKERUNIT CORPORATION

SIMPLEX Precision Boring Machines and Planer Type Milling Machines

4530 West Mitchell Street, Milwaukee 14, Wisconsin



Closeup of the V-9505 cage showing milled elongated slots and drilled holes.

Roy Johnson, Adel Superintendent of Tooling, lives up to the concept of a slogan hung in his Office:

NEOPHOBIA
(Fear of Innovation)
Is The Death of Progress

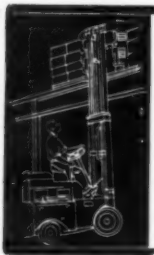
This postulate and spirit moves the Adel organization. It is youthful in years and capable in tooling experience. It is concerned and impressionable. The effect of its intent has been evident in machine tool designs involving the cage. Machining time (thru a series of improvements) has been reduced finally on the third operation (mill) of this cage from 20.3 minutes to 30 seconds; and on the fourth operation (drilling) from four minutes (former operation requiring a tumble of six times with loading) to 15 seconds. The Adel group calls its combination milling and drilling machine the "wash tub".

The cage is received rough formed, recessed, rough bored on two diameters, rough reamed to a plus or minus .002" and burred i.d. in the first two operations. It is then put thru the wringer on the "wash tub" in its third and fourth operations.

A flashback on this machine design:— These milling slots originally were accomplished on a horizontal milling machine, using a hand milling fixture. The cage was loaded in the fixture. The table

How Air Cargo Loading HELPED DESIGN BETTER LIFT TRUCKS

The need to boost heavy loads high up into huge cargo planes made the use of compact, powerful, quick-acting clutches necessary. The problem was solved with — PULLMORE Multiple Disc CLUTCHES.



PULLMORE CLUTCHES

To manufacturers now designing and experimenting with similar products, we offer the assistance of our engineers' long clutch application experience — without obligation.

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Give capacities, dimensions and specifications. Contain application diagrams. Show **HOW** exclusive PULLMORE features are being used to help give new products competitive advantages.

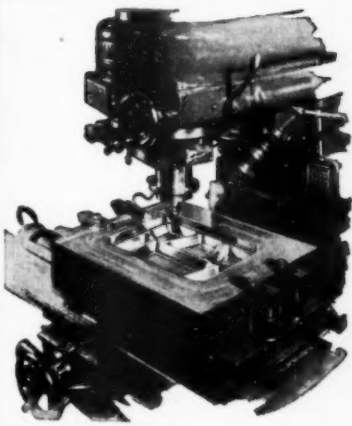
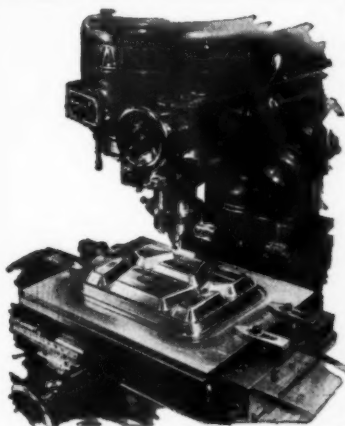


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Pullmore Clutches are sold by Morse Chain Co., offices in principal cities

USE ROCKFORD INDUSTRIAL CLUTCHES FOR SUPERIOR PERFORMANCE AND ECONOMY						
Machine Tools	Process Machinery	Farm Implements	Materials Handling	Earth Movers	Service Machinery	Power Units

Pullmore Multiple-Disc Clutches • Over-Center and Spring-Loaded Clutches • Power Take-Offs

How would you handle this job in your Shop?



Photos — Courtesy Eclipse Molded Products Company

Molds for plastics pose some tough milling problems occasionally. Here's a tray mold—that could have been difficult, but it was completed on a Milwaukee Rotary Head Milling Machine with typical speed, economy, and accuracy.

Read this job report —

TRAY MOLD

CAVITY SIZE — width, 12 inches, length, 15½ inches, depth, 1½ inches.

Time required for milling both mold halves complete — 219 hours.

All form cutters milled to correct size and shape on the Milwaukee Rotary Head Milling Machine.

Check these advantages of the Milwaukee Rotary Head Milling Machine and how

you can benefit from them in your own shop: **DIRECT**... mills mold cavities in a single set-up without the aid of templates or models. **ACCURATE**... chances for error are eliminated because there is no change in set-up. Exact control of all combinations of cutting movements — possible only with this machine — transmits mathematical precision to the work.

FAST... initial job preparation and set-up time is reduced to the minimum. Accurate performance of the machine saves operator's time and rapid production of intricate molds and dies is the result.

Write for Bulletin No. 1002C and complete information.


KEARNEY & TRECKER

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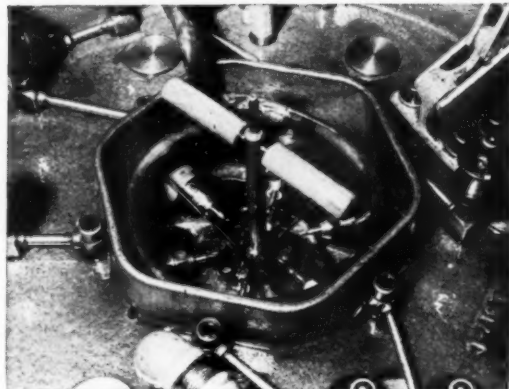
CORPORATION

Milwaukee 14, Wisconsin

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 BUILDERS OF MILWAUKEE ROTARY HEAD MILLING MACHINE • FACE MILL GRINDER • AUTOMETRIC JIG BORER • SPEED-MILL • MIDGETMILL • CENTER SCOPE.

Closeup of cage in wash-tub showing Ed Mills' method of locking part in place and lubricant flowing on part.



was fed up. The part was oscillated by a handle. Each slot was milled individually. Six slots were involved in the machining sequence. After completing the work on these slots, the fixture was indexed 60°, the handle was inserted and

the procedure was rotated. This took 20.3 minutes.

Under the principle of progressive dissatisfaction, everywhere evident in Adel machining practice, slowness of this procedure came under challenge. New tool-

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accurate
speedy
counters



for production machines

You have to know what your machines are doing . . . and know it instantly! Whether it's the number of pieces or parts produced . . . strokes or revolutions . . . feet or yards . . . cartons or cases. . . Such information is illustrated: Rugged, high-speed Stroke Model 5-H-1-1-R.

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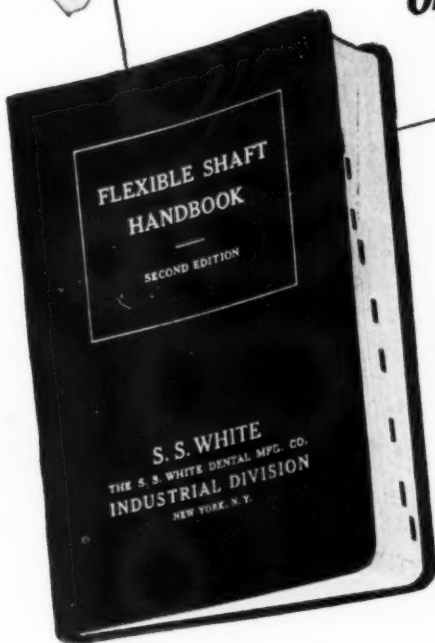
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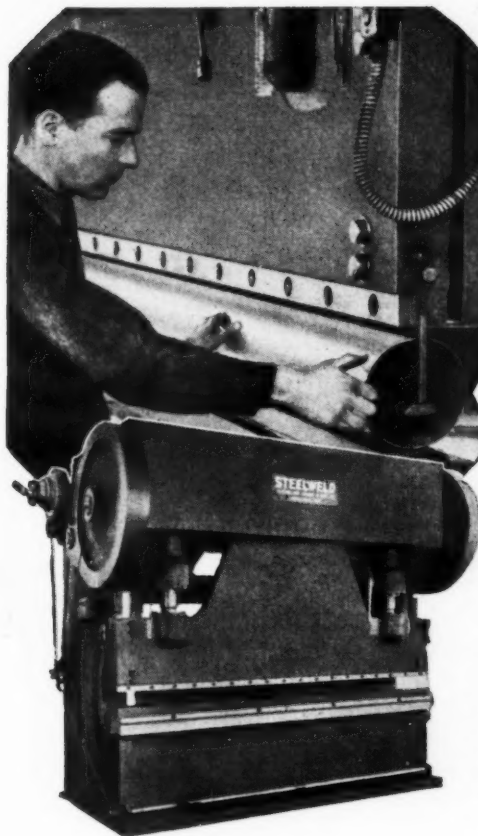
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ing was considered. Original design of the first "wash tub" was based upon the production of 80,000 cages. This tooling could be considered of temporary tooling nature. Orders multiplied to necessitate rework of the tooling with redesign and improvements of such phases of its function as ball bearing substitutes for oilless.



Setup on Heald Borematic for finishing cages.

This was before the war. Gradual refinement over some three years in the machining process evolved permanent tooling which concerned installation of better gears, oil system, chip removal channels. The machine was accommodated with a 15 gallon, atmospherically cooled oil tank. Spindle bearings were added to make possible 2400 rpm with spindle tolerances of .001" cut down to .0002". Hardened steel bearings, ground and lapped to replace bronze bearings, have now operated 13 months and are still in good condition. Former bronze bearings were replaced each three months. The old dimension was one inch long. The bearing is 1 $\frac{1}{8}$ " long; the shaft is hardened, ground and chromed.



Forming a 6-inch diameter cylinder on a Cleveland Steelweld Press. Machines can be furnished for forming cylinders in lengths up to 20 feet.

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Small diameter cylinders, square and hexagon tubing and other closed shapes are easily made with simple dies on Cleveland Steelweld Presses. Special steel dies are usually used for large quantities, but for small numbers a steel male die and a female pressure pad made of rubber is often used.

A series of successive bends are made starting at the ends of the sheet and finishing with the center bend. The dies are so made that the cylinder or tube when removed from the machine will spring to a closed position.

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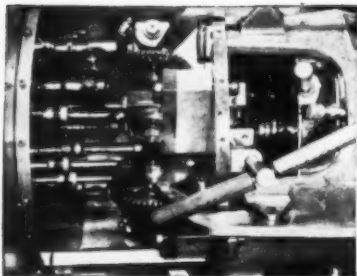
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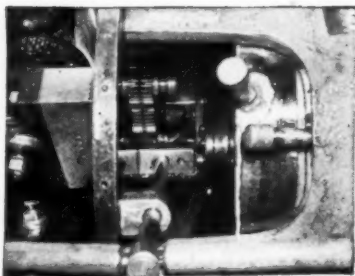
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Closeup of feed control showing actuating cam and gears.



Closeup of oscillating mechanism, left center of pictures.

Presently, this Adel multiple mill and drill machine is driven by two motors:—An 1800 rpm one hp motor driving the drill and mill heads; a ½ hp motor taking care of the coolant system.

Drills and mills are mounted in horizontal chucks of Adel design, being very accurately placed six inches out from center point in relation to main bearing at 60° plus or minus one minute. Mills

have a cutting end of ⅛-¼" dia. with shank to fit chuck. (The setup can handle ⅛" to ¼" dia shanks).

The cage part is centrally located on a vertical arbor, locked in by either of two methods:—(a) a knurled screw thru the part, (b) a swinging cam clamp for drilling, (c) expanding arbor for parts which have no thru hole.

The part chuck movement is controlled

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by clutch. This clutch can be disengaged so that the machine will fall into full automatic motion. Movement is from a worm gear control by clutch to individual cams which impart a "thrust and back away" motion.

A unique 4-stage time control facilitates

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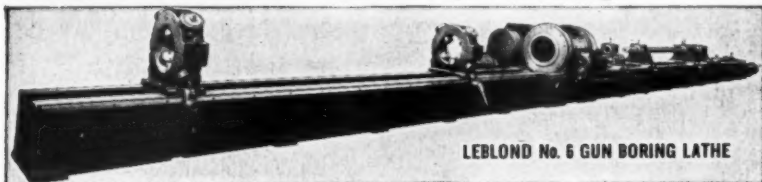
just a *Stumble bum*

You've seen them in the ring floundering around under a rain of gloved fists. You've seen them cadging nickels and dimes on the streets . . . the men who paid no heed to the ravages of time and remained in a profession whose great requisite is youth. The years caught up with them. And with the years came the cauliflower ears, the scar tissue around the eyes, the crooked nose. Once they were good. Now they are "Has Beens"—"Stumble Bums" unfit for the gruelling competition of their calling.

But what about those "Stumble Bums" in your plant, Mr. Manufacturer? Those old lathes of yours that have seen better days. Once they were good too, probably the best. But the years have caught up with them and now they too are just "Stumble Bums"—and very definitely unfit for real competitive production.

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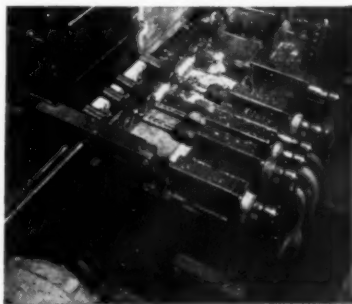


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FRANKENMUTH, MICHIGAN

backup. Speeds involved in these four cycles are:—960, 1380, 1900, 2400 rpm. All movement is controlled by rise and fall of the cams.

The use of this machine in the milling operation (involving the milling of six $\frac{1}{8}$ " slots x .290 dimension) employs an oscillating movement furnished by an eccentric and link drive connected to main center of the vertical drive shaft. It has adjustable oscillation feature to meet the requirements of .290 dimension. (This dimension facilitates proper hydraulic flow for the fine functioning of the midget valve). This feature on the oscillating mechanism can be brought back to neutral. With the vertical shaft then stationary, the machine is used for drilling. This adjustable eccentric feature is essentially a block mechanism with a position screw that facilitates ready contrast of function from concentric to eccentric.



Closeup of drilling operation on 14 spindle drill with 3-head setup.

Milling action, involving the $\frac{1}{8}$ " slots (six) .290 dimension is:—The mill comes in and the part oscillates to procure dimension, ends of the slot conforming to the radius of the end mill. When on automatic feed, loading is done on the fast pull-out and infeed cycle control of the cam.

The coolant is piped direct to the cutting point of the drills and end mills thru pipes of stationary location. The lubricant always hits the cutting surface of the tool. The coolant is a lard oil serviced by the 15 gallon tank and a motor driven pump operating under standard pressure

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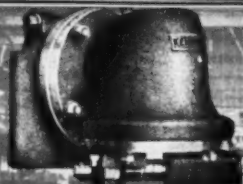
with recirculation thru strainer chip channels to the tank.

In the progressive design of this tool there was difficulty in finding the exact concentric point for repetitive success of the machining function. This caused time, trouble and much resetting. An able older tool maker (Anton Braun of Johnson's staff) who received his tooling training in Baden, Germany, solved this problem by originating a separate reducing gear capable of operating eccentrically for milling which could be disengaged for concentric drilling merely by un-slotting the gear, on the top of the shaft. This permitted leaving the eccentric always in position.



Cam drive arrangement, 14-spindle drill.

An unusual feature of the design is the geared adjustment of the clamping chuck. Formerly, this was accomplished by a 3/16" pin and could be reached only by extending the arm far into the mechanism with the attendant operator hazards, oil, sore fingers, plus the further nuisance that the machine had to be brought to stop. Now, Braun ingenuity has designed a miter gear on the shaft. This reaches outside the machine to permit easy ad-



HEAVY DUTY UNIVERSAL
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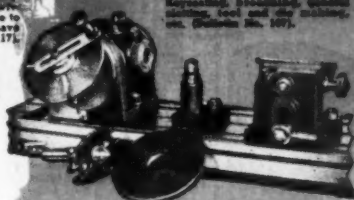
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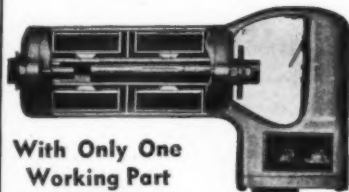
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It takes him over
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100 1/2" x 2" holes.



**30 Blows
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**THIS MAN
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It takes him about
1 hour to drill 100
1/2" x 2" holes.



3000 BLOWS PER MINUTE

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Closeup of cam operated, positive ejector mechanism, center foreground of picture.

justment without machine stoppage, eliminating all operator hazard. This is adjusted by a simple "T" shaped handle.

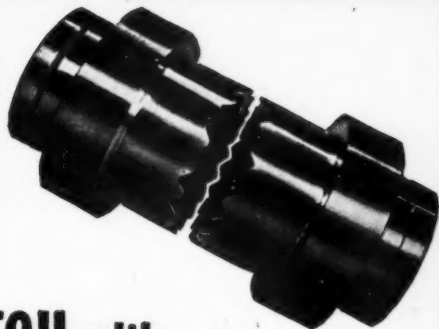
The drilling operation of six 1/8" diameter holes on .475 diameter is done on this same special Adel mill merely by disengaging the eccentric to permit drilling. These holes are equally spaced. All machining movements are the same. The four speed range of spindles is adjusted thru sheaves and pulley combinations.

In the 16 operations involved in the machining sequence of this cage, a ticklish job is involved in the boring sequence on the Heald Borematic. This is described in the routing sheet, including tolerances, as:—(a) Place in Borematic; (2) Face; (3) Finish bore .343 diameter plus or minus .0005"; (4) Finish bore .406 diameter plus or minus .001"; (5) Finish bore .3517 diameter relief plus or minus .001"; (6) Finish inside of seat; (7) Finish turn .651 diameter o.d. plus or minus .001"; (8) Face top seat and shoulder of .140 dimension; (9) Chamfer .7765 diameter and .650 diameter plus or minus .001" shoulders on first spindle; (10) Lap burr

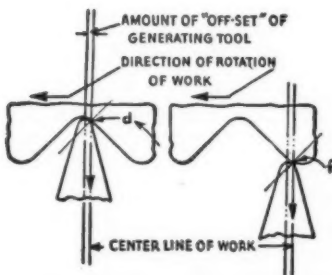
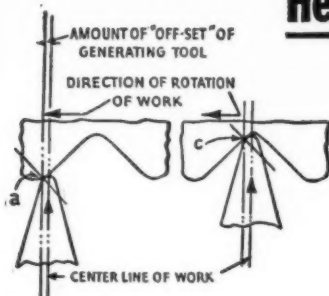
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Accurate helicoidal tooth surfaces on this face clutch are produced on the Gear Shaper equipped with a special attachment, by the "offset" generating method. The center line of the single-point cutting tool is "offset" from the axis of the work, to bring the contact point of the tool directly over the center line of the work. (Contact points at various stages of cutting are indicated at a, c, d, f.)

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Once it's gone there's no reclaiming it. But you can cut your finishing time 'way down with Haskins Flexible Shaft Equipment. Forget old hand-finishing methods. Your men will work faster and better, with less fatigue, the Haskins way. Every hour will see increased production. Man-hours—plus machine-hours will really mean something. For important new time-saver methods, send for your copy of Catalog 45. R. G. Haskins Company, 623 So. California Avenue, Chicago, Ill.



H-6



haskins

FLEXIBLE SHAFT EQUIPMENT

from .343 diameter if necessary; (11) Place on second spindle; (12) Finish turn .7775 diameter plus or minus .001".

The ticklish work on this operation is caused by the fact that leakage is a severe hazard to be overcome in fabricating any hydraulic part, particularly in seats. Finish machining must arrive at close tolerances to obviate necessity of hand burring. Mr. Johnson is quoted in relation to Adel methods from this standpoint:—"To eliminate as much hazard of the human factor in hand burring as possible, the Adel technique is such that wherever drilled holes break into another drilled hole in which a major burr condition can be anticipated, operations are set up so that the hole into which the burr will occur is rough drilled and subsequent operations then follow so that final reaming will remove the burr without necessity of hand work."

Tho not concerned in the machining of this cage, another example of good Adel machine tool design is the 14-spindle multiple drill. This is used particularly in Adel fabrication of line support blocks and clips of which over a thousand varieties are produced for the many airframe assembly requirements in most military aircraft. The multiple drill is an achievement of Mr. Johnson. It can be defined as an adjustable position, central drive shaft, horizontal, straight flat belt driven ($\frac{1}{4}$ turn) multiple tool to drill $7/32$ " holes. It employs a split chuck of Adel design and is of variable speed. The movement is cam driven with quick in-feed, slow drilling speed, fast backout.

A Sterling one hp motor drives the main shaft. This in turn drives the drill heads by individual belt ($\frac{1}{4}$ turn). These drill heads are equipped with special split chucks. They move in line horizontally to a bushing plate which is stationary.

A second $\frac{1}{2}$ hp Sterling is hooked up by belt to a second shaft and mounted to a Boston reduction gear box No. VA80 (80 to 1 reduction), which imparts motion to a cam, turning at 32 rpm, controlled by clutch to throw out at any point desired on the periphery. The cam movement controls the feed of the drill.

The cam is equipped with a bottom track which actuates a positive knockout mechanism by cam and link control in a

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Button dies quickly changed.

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push effect thru one end of the drilling sequence.

Bushing holders clamp the mechanism for drilling. This hold-down is actuated by a third stationary cam track with an inside finger powered off the main slide. The upper leaf of the table (which positions the work between the bushing plates and the upper slide) governs the solid clamping action which then imparts motion to a lower table leaf that brings the work forward into contact with the drill. This two-phase sequence of the upper and lower slide movements of the table leaves seems definitely unique. Upon release of the action, tension returns the lower leaf to positive stop, while the upper leaf slides back to its starting position by cam movement.

The machine has a gravity feeding magazine, with an adjustable flow control to handle widths and lengths of work required to accommodate any drill setup.

SALT POT CONTROL

A method for holding constant the temperature of electrically heated salt pots, by means of a reliable control system which readjusts promptly the rate of heat input at the first indication of a temperature change, is described in a new 8-page bulletin.

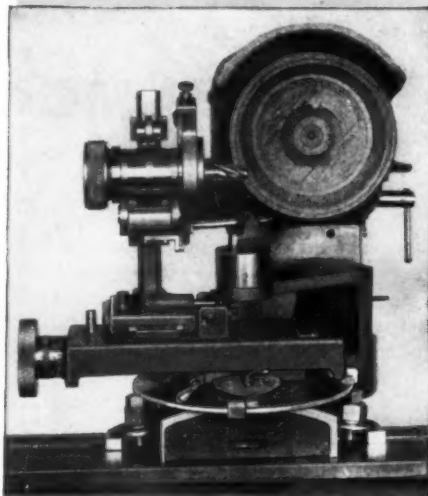
It describes equipment suitable for either internally or externally heated salt pots—a Rayotube detector and a Duration-Adjusting Type of Micromax Electric Control. Together they comprise a system developed to provide the same close regulation which M.E.C. control formerly made available only to those fired by fuel.

A copy of this illustrated publication N-33B-621 (1) is available from Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa.

TOGGLE-ACTION CLAMPS

A catalog showing toggle-action clamping devices has been released by Knu-Vise, Inc., 1334 Plum St., Detroit 16, Mich. Its 58 pages, in plastic binding, carry photographic reproductions of the full line of their products, including clamps, of four types, "C" clamps, pliers and wrenches, together with mechanical drawings showing dimensions of various sizes and descriptions. A page is devoted to information relative to recommended pressures of the various models, and a price list is included. Templates are available for all models listed.

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WITH MEYERS**



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**WHEEL AND
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fast operation and long,
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Meyers Radiform Attachment for generating predetermined precision radii on spiral fluted end mills without previous wheel forming. Other Radiform attachments available for supporting

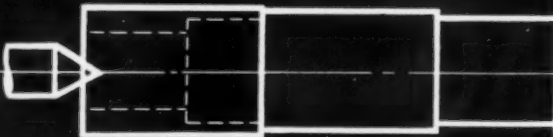
tool bits, milling cutters, die sinking tools and other forming tools to be generated directly against a grinding wheel. Time and cost of forming wheels is eliminated.

*Write; wire; or call for
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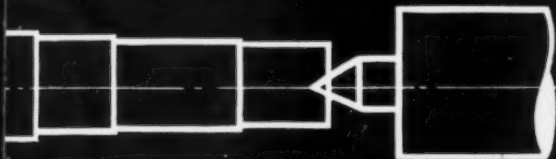
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Machining time on this shaft was cut 23%, by using Automatic Feed Changes on a "Monarch Automatic Sizing Lathe". This substantial time saving is especially important today . . . and also indicates how costs can be cut with modern equipment. This 23% saving will be multiplied by the number of machines attended by each operator.

This specific job has five diameters, with feed rates automatically ranging from $\frac{1}{2}$ " to 2" per minute, determined by the depth of cut. Without Automatic Feed Changes, all diameters would be machined at the feeding rate for the starting diameter.

Monarch Automatic Sizing Lathes, with Automatic Feed Changes, have many applications for step shaft turning and similar work. Our engineers are at your service to see if their advantages can be applied to your work to save time and reduce costs.

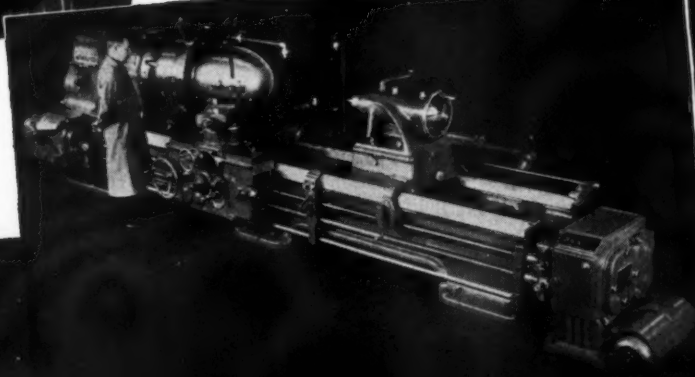
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with Monarch Automatic Feed Changes!

Automatic control mechanism is centered in the cabinet which houses the necessary rheostats to control the speed of the 4 to 1 d-c motor driving the entire feed unit. Any desired feed, from lowest to highest, is automatically provided for any or all diameters. Or, the Automatic Feed Change unit may be instantly disconnected, to allow constant feeding rate on all diameters.



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MILLED TOOTH

VIXEN FILES

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years...**

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PERFORMANCE ON BOTH HARD AND
SOFT METALS AND OTHER MATERIALS**

Of a distinctive milled cut tooth design, this 14" Heller VIXEN Flat Double-Cut Milled Tooth File, No. 859, is particularly recommended for such soft metals and materials as babbitt, brass, bronzes, copper, aluminum, lead, plastics and fiber. It has been widely used FOR MANY YEARS on hard and soft rubber and as metal pattern work.

As its name indicates, it is a double-cut milled tooth file. The rows of teeth are spaced wider toward one side of the file than they are toward the other. The result is the characteristic tooth design illustrated that en-

ables this special Heller VIXEN to cut both rapidly and smoothly.

No. 859 VIXEN works with a genuine shearing cut, inasmuch as no two successive teeth in any longitudinal row are in alignment. It produces a much smoother surface in cutting soft materials than is possible if the file teeth were to follow each other at regular intervals. Chattering is eliminated, and a more durable, long-lasting file is obtained.

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*America's Oldest File Manufacturers
Good Tools Since 1826*

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**CUTS
quick, deep,
clean**

**• NO
chipping**

**• LEAVES
smooth finish**

**• NO
scratching**

**• NO
scraping**



**GENUINE
HELLER**

VIXEN

**CURVED
TOOTH
FILES**

**THREADS AND FORMS
PLUNGE GROUND
WITH CRUSHER DRESSED
WHEEL**



The crusher dressed multi-ribbed grinding wheel offers important savings in both time and production costs in grinding precision threads and circular form or profile work.

In a plunge cut with such a wheel on the Sheffield Thread and Form Grinder, a single or multi-start threaded section, the length of which does not exceed the thickness of the wheel, is completed in $1\frac{1}{2}$ revolutions of the work part. For larger parts traverse grinding is used.

Wheels are crusher dressed in a small fraction of the time it takes by conventional methods and they have more effective cutting surfaces. Furthermore, the multi-ribbed wheel stands up longer.

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MO-MAX
TRADE MARK REG. U.S. PAT. OFF.
HIGH SPEED STEEL

It is estimated that at the height of the war effort there were in operation in American industrial plants about TWO MILLION machine tools. The greater proportion of these machines are cutting tools - lathes, drills, planers, shapers, millers, gear cutters, threading machines, to mention but a few. Because of radical changes in manufacturing methods, it is believed that only one out every four of these machine tools will be adaptable to post war production.



For Heavy Cuts ... At High Speeds ...

The combination of great toughness and a high degree of hardness give MO-MAX superior cutting ability. This makes possible heavy cuts and the use of high speeds in a wide range of cutting operations.

Cutting tools made from MO-MAX, in actual tests, show 20% more work per grind per tool than those made from other steels. That advantage may be the difference between operating your machines economically or wastefully.



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THE WHY AND HOW OF MO-MAX

This is not a booklet prepared primarily for selling purposes. Its 52 pages of sound, scientific facts trace the eleven-year development of molybdenum-tungsten steel. Photographs and graphic charts make the text easy to understand and gives operating and handling instructions for its proper use.

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COATED ABRASIVE BELTS

Make WAR HISTORY

By THOMAS TROWBRIDGE*

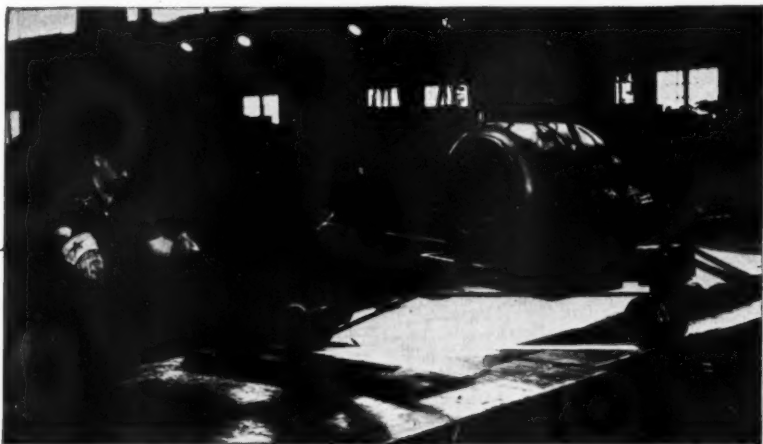
MODERN, technically controlled coated abrasives — really scientifically made tools—are one of the cases in point. Many jobs for surfacers, millers, profilers, and such expensive and intricate machines have been converted to the use of fast running abrasive cloth belts with most gratifying and startling results. Time has been saved, finishes improved, and the sometimes cumbersome machines released for more profitable work.

Not only have jobs formerly done on such machines been converted, but many

operations such as deburring, removing mould flashes and breaking edges formerly done by hand filing or scraping methods are now being accomplished in a fraction of the time required by hand, and better and more uniform finishes obtained.

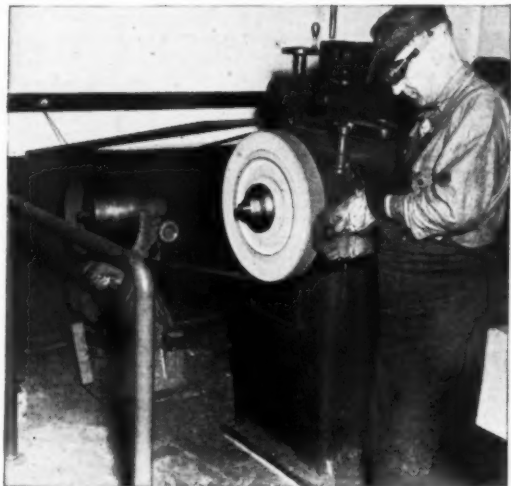
The swing frame grinder, formerly made only for the use of solid grinding

*Equipment and Products Engineering
Dept., Behr-Manning Corp., Troy, N. Y.,
U. S. A. (Division of Norton Co.)



This swing frame grinder uses a fast-cutting coated abrasive cloth belt and is typical of many used effectively on war production operations.

Floor type back stands have been widely adopted in war production industries. Using fast-cutting cloth abrasive belts, they are extremely versatile and are used in a wide range of finishing operations in war production work.



wheels, now has an effective counterpart in one which uses a fast cutting coated abrasive cloth belt running about 6000 sfpm over a specially constructed contact wheel.

Idler backstands make it possible to convert a polishing jack with its clumsy, difficult-to-control set-up wheel, to a speedy belt operation with factory coated abrasives of sharp, fast-cutting, uniform surface.

Wet belt sanders employing waterproof abrasive cloth belts now grind to such close tolerances as .0005", many metal parts in less time than it would take to set up the part in a jig-for milling.

These are a few of the machines and operations where modern coated abrasives have helped in the war effort. They have so conclusively proven their ability to accelerate production and improve finishes that their acceptance is continuing at a constantly increasing pace.

The swing frame belt grinder is being used today for an ever-broadening range of operations where the rapid removal of metal and better finishes are sought than can be obtained from grinding wheels. Typical operations are the removal and blending of welded seams on large steel tubes used for bomb casings; for the removal of welded seams on

METAL STAMPINGS

IN SMALL LOTS

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MINNEAPOLIS 7, MINN.

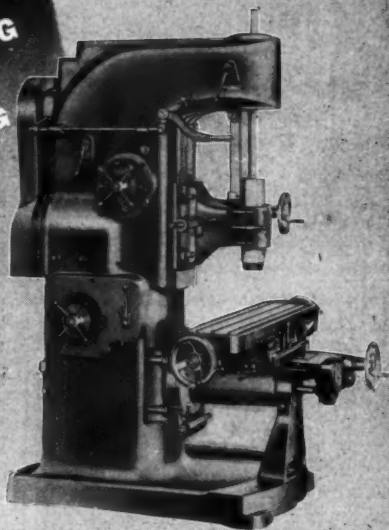
There is no other method of producing metal stampings in small lots that can equal the process originated by Dayton Rogers Mfg. Co. No matter how intricate the design or how small the quantity requirements, we can show you a definite saving.

The **KNIGHT MILLER No. 40**

Performs . . .
**FIVE OPERATIONS AT ONE
SETTING**

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- **PROFILING**
- **KEYWAY
CUTTING**

This milling machine will perform and accurately produce to full capacity at all speeds and feeds. Here are some of the ways that the **KNIGHT MILLER** can save you valuable hours on many jobs. Equipped with a special swivel and tilting table that saves the use of angle plates, cutters and special fixtures. The No. 40 has a wide range of capacity fitting it for many jobs and uses. There are 16 different spindle speeds and 16 different table feeds available.



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Universal Boring Chuck



Especially designed

to hold Boring Bars in mill-
ing machines or boring mills.

Allows bar to be advanced or
receded to a length to suit work. Will bore
holes to a tolerance of .0005. Can be ad-
justed to compensate for wear. Made in two
sizes to accommodate bars from $\frac{3}{8}$ " to 1" with
milling machine taper or Morse taper shanks.
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Army Navy "E"
Flag Two Stars

Fighter Plane
Given by employees

20% Employees
Bond Deduction

UNIVERSAL ENGINEERING CO.
FRANKENMUTH, MICHIGAN

armor plates used as protective shielding for anti-aircraft guns, and for grinding and finishing heavy steel castings or forgings such as locomotive connecting rods.

An installation of a swing frame belt grinder was made recently by one of the country's largest builders of locomotives for the removal of weld seams on the steel plates forming the sides of locomotive tenders. The coated abrasive cloth belt was operated over a leather contact wheel in place of a grinding wheel and a greatly improved finish was obtained in less time. As a matter of fact, the improved finish and time saved on this operation alone were sufficient to prove the superiority of the swing frame belt grinder method and persuaded them to install the grinder.

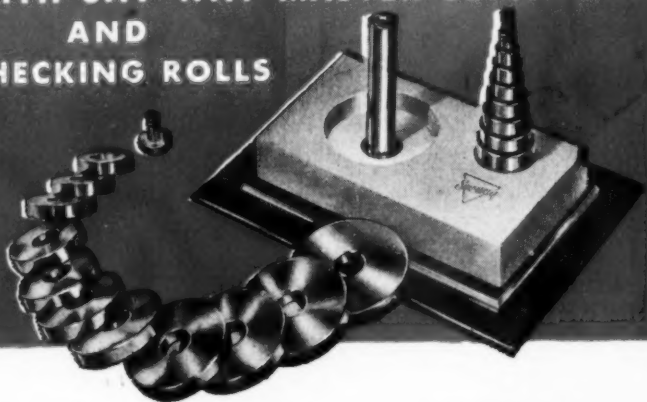


The wet belt sander handles a great many types of jobs with speed and economy.

However, the greatest saving was accomplished as the tender reached the paint shop. There it was found that the finish imparted by the coated abrasive belt had completely eliminated the hollows or depressions usually present after removing the seam with grinding wheels. The smoother grinding action of the abrasive cloth belt resulted in such an

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Our No. 703—three layers of seven diamonds each. Multiplicity of cutting points; depending on diameter of wheel, four or more diamonds will always contact the wheel, giving finer dressing and precision finish. Recommended in all straight-faced dressing and truing on wide-faced, hard silicon carbide wheels. Used most effectively on Cincinnati Centerless, Norton Cylindrical, Landis Cylindrical, and Cincinnati Cylindrical Grinders.

Requires fewer passes across the wheel.

Generally used with fast dressing traverse.

"Experts agree they are the best on the market."



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31 W. 47th St., New York 19, N. Y.
Branches: London; Bahia, Brazil



Bench type back stands fill a useful role in many war time shops.

even, uniform surface that it was immediately possible to start priming the sides of the tender for painting. This dispensed with two days' time previously required to fill in surface irregularities caused by the grinding wheels.

An unusual application of the swing frame belt grinder has been developed for a manufacturer of glass-lined stainless steel milk tanks. The operation consists of removing weld seams and finishing the exterior surface of the concave saucer shaped ends of the tanks. One man operating the swing frame belt grinder is now able to accomplish in one day, the same results which formerly required two men two days. This is a saving in time alone of approximately 75%.

And now for a little further light on idler backstands, in which we will consider the floor type first. This equipment makes it possible to use an abrasive cloth belt for grinding many parts formerly finished on set-up wheels. An abrasive cloth belt, run over a contact wheel of proper density, will produce a smoother and more uniform finish in far less time.

DOES A *Good Turn* ON 1045 STEEL

SUNOCO EMULSIFYING CUTTING OIL

helps rough turn 18% spindle head at 265 S.F.P.M.

A good rule when you want a good turn is to use the right cutting oil. That's why so many leading metalworking shops rely on Sunoco Emulsifying Cutting Oil for all operations where a soluble oil can be used.

Just one example is the operation shown, where a large machine tool manufacturer uses a 20 to 1 mixture for rough turning the head end of a large spindle made of S.A.E. 1045 steel. Sunoco meets all requirements of tool life, tolerance, finish and speed. Sunoco's advantages can be applied shopwide, too... not only on turning operations, but for milling, boring, drilling, hobbing, slotting, grinding, etc. The high heat-absorbing and lubricating properties of Sunoco Emulsifying Cutting Oil aid in the prevention of overheating and drawing of the temper at the cutting edge. Chips do not seize... tools cut cleanly, evenly, at high surface speeds.

In the reconversion period, just as during peak war production, metalworking plants will depend on Sunoco to give them maximum machining efficiency... with utmost economy. Now is the time to consider Sunoco Emulsifying Cutting Oil for your plant. Get the recommendations of a Sun Cutting Oil Engineer. Write...

SUN OIL COMPANY • Philadelphia 3, Pa.
Sponsors of the Sunoco News Voice of the Air—Lowell Thomas

PERFORMANCE DATA

OPERATION—Turn head end of spindle

MACHINE—Ballard 36" Vertical Turret Lathe

MATERIAL—S.A.E. 1045 Steel Forging

ROUGH TURN—18% diam. per

SPINDLE SPEED—54 R.P.M.
CUTTING SPEED—255 S.F.P.M.

FEED—.018"

DEPTH OF CUT—5/16"

CUTTING LUBRICANT—1 part Sunoco to 20 parts water



SUN INDUSTRIAL PRODUCTS

HELPING INDUSTRY HELP AMERICA



PRECISION TOOL BUILDS PROFITS



The Ellis Double-Swivel DIVIDING HEAD

★ With the Ellis, you get the 4 big advantages: (1) Direct indexing, (2) Adjustable Ground Worm, (3) Instantaneous "Free-Wheeling", (4) Lifetime no-back-lash adjustment of worm gear.

Capacity $6\frac{1}{2}$ " to 11".

The Ellis converts any ordinary milling or tool grinder into a "universal". A quality tool in the moderate price field . . . Write for complete information
Bulletin No. 1

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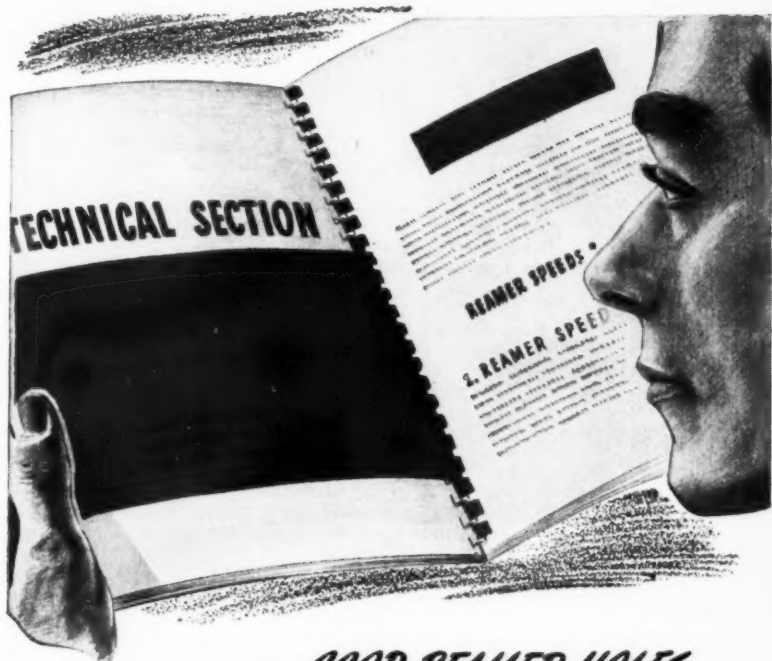
Eastern Distributor
NICHOLS-MORRIS CORP.
50 Church St., N. Y. C. 7

A number of manufacturers are now building excellent backstand units, all employing the same underlying principle of an idler pulley to permit the substitution of a coated abrasive cloth belt for a set-up wheel. For the latter, a cushion contact wheel is substituted. Such wheels are available in cotton, leather and rubber, the cotton being most generally used. Also, any density may be obtained to suit the work. This contact wheel, driven by the lathe or jack gives the motive power and is also the point at which the operator applies the part to the abrasive cloth belt.



The Mead belt sander offers a speedy and economical way of solving finishing problems on small parts.

It is immediately sensed how the characteristics of a factory-made belt provide great advantages over the old method. Its surface is sharper; it is uniform; its length disperses heat faster; it is available in 15 grit sizes; belts can be changed in a few seconds; it does away with all the space, effort and time required to produce and recoat wheels; eliminates loss of abrasive grain; and at the same time accelerates production and improves finish.



HOW TO GET *GOOD REAMED HOLES* THIS FREE BOOK TELLS HOW

This valuable book will help you eliminate reaming trouble, increase cutting production and reduce tool costs. It answers such important questions as—

What are the best reamer speeds? What conditions contribute to chatter and out-of-round holes—and how can they be corrected? What are the best reamer feeds? What is the recommended practice on tool body diameters—on land widths—on reamers piloted through bushings?

It gives you valuable suggestions on sharpening and reconditioning carboly-tipped reamers. Fully illustrated with photographs and diagrams that are easily understood.

This Technical Manual is included in the complete catalog on Staples Carboly-Tipped Circular Cutting Tools. Your machine operators will find the data in this book of real practical help. Send for your copy today.

Staples Tool & Engineering Company
Cincinnati 25, Dept. MT . . Ohio

Staples

CARBOLY-TIPPED CIRCULAR CUTTING TOOLS

REAMERS • CORE DRILLS • SPOT FACERS • COUNTERBORES • END MILLS •
SHELL END MILLS • ALSO A COMPLETE LINE OF CIRCULAR SPECIAL TOOLS



\$29⁷⁵ Weight 12 Ounces; Length 6 3/4 In.;
 in U.S.A. Chuck Size 1/8 In. Wheel Guard
 Removed for Better Illustration

The Model JA is new in design both inside and outside. In it are utilized fewer parts, and they are made of Magnesium and Aluminum for extreme featherweight lightness. The alloy steel shaft diameter is unusually large for sustained smooth and true operation. This means still longer wheel life and better grinding. The speed, as before, is governed at 90,000 R.P.M. and there are selected ball bearings, front and rear. The JA Featherweight is a distinct improvement over all models previously produced by Madison-Kipp, the originators of really high speed grinders.

The same low price, \$29.75 in U.S.A., remains. It is a post-war design for which materials have been released early. The pre-announcement output was geared to expected demand. Deliveries will be made out of stock as long as possible.

MADISON-KIPP CORPORATION
 207 WAUBESA ST., MADISON 4, WIS., U.S.A.

The most common practice is to mount the idler backstand directly behind the polishing lathe. Four feet from center of lathe spindle to center of idler pulley is a good average distance, as it provides a belt long enough to give cool-cutting performance and yet conserve space.

Such a belt, about 14 feet in length and 4" wide, running over a contact wheel 14" in diameter, has a cutting surface of 672 square inches, contrasted with the former set-up wheel—and we assume the same dimensions, 14 by 4"—176 square inches, practically 4 to 1 in favor of the belt, permitting higher speeds with less heat.

Where space is limited, it can be taken care of in one type of machine by a wall mounting; in another, by the use of a backstand with two idler pulleys which can be located very close to the lathe and yet not sacrifice belt length.

Recently, a manufacturer producing 105 mm shells installed several backstands for removing peripheral tool marks from painted shells which had been rejected because of poor machining.



Abrasive gadgets of many types and sizes are available for use in portable high speed grinders and drills.

Ingersoll

CARBIDE TIPPED CUTTERS



RAY BLADE



NEGATIVE ANGLE
FACE MILL



NEGATIVE ANGLE
SOLID SHANK



MEDIUM DUTY
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FULL SIDE MILL



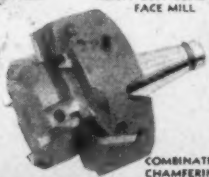
HEAVY DUTY CONE TYPE
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TYPE RQ



STAGGERED TOOTH
SLOTING



COMBINATION BORING
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CYLINDER BORING



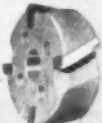
BORING BAR



TYPE NX



BORING BAR



SPAR CAP MILLING



SHEAR CLEAR



NEGATIVE ANGLE
SLOTING



Ingersoll specializes in the manufacture of carbide tipped cutters for milling and boring operations. The wide variety of standard Ingersoll designs covers most applications. Consult Ingersoll regarding increased production through use of carbide tipped milling and boring tools.

Ingersoll carbide tipped blades are copper brazed in atmosphere controlled furnaces to insure a strong uniform bond between tip and shank. Send your inquiries for replacement blades to Ingersoll. Note the many types illustrated above.

Send for Engineering Specification Sheets describing standard inserted blade cutters. Any of the designs may be furnished with carbide tipped, high speed steel, or cast alloy blades.

THE INGERSOLL MILLING MACHINE CO., ROCKFORD, ILL.

These units were installed because previous tests had proven that one coated abrasive cloth belt produced in the same period, three times as many shells as were obtained from two set-up wheels. Furthermore, the finish produced by the belt was so superior to that obtained with the set-up wheels that the number of rejects was reduced to a minimum. In addition, the cost of the abrasive cloth belts was half of the expense involved in maintaining and setting up the wheels.

Another outstanding example of the use of abrasive cloth belts with a backstand idler in place of set-up wheels was experienced by a manufacturer who was finishing odd shaped cold-rolled steel parts. One abrasive cloth belt completed over 1300 pieces which would have required the use of nine set-up wheels to obtain the same production, and again the finish was greatly improved resulting in a much lower rate of rejection.

Results such as these prove beyond any doubt the worth of the backstand principle of grinding and finishing with Metalite Cloth belts operating over suitable contact wheels.

The floor type backstand has its smaller companion in the bench backstand, now being produced by several well-known machinery manufacturers and meeting with universal acceptance. These smaller machines employ the same principle of grinding with a fast cutting factory-made abrasive cloth belt running over a cushion contact wheel, 6 to 7" in diameter, with 2 or 2½" face.

Many small, light parts, requiring the removal of burrs, flashing or tool marks can be finished more efficiently by this method than by a set-up wheel or grinding wheel.

It is also possible to obtain the bench type idler backstand independent of the complete unit and by installing a suitable contact wheel in place of the present grinding wheel, bench grinders now in use can be converted to the use of abrasive cloth belts. Such conversions of bench grinders mounting two grinding wheels offer great advantages to the machine shop, garage, and maintenance trades where intermittent grinding and finishing of small parts are regular practice.

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You can best meet the demands for greater accuracy in production inspection with Smith Master Surface Plates. Available in a wide range of sizes from 8x12 to 36x68 inches. Our deliveries are now being made promptly.

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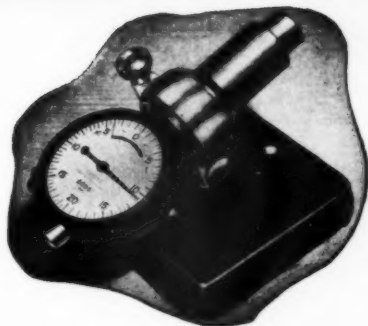


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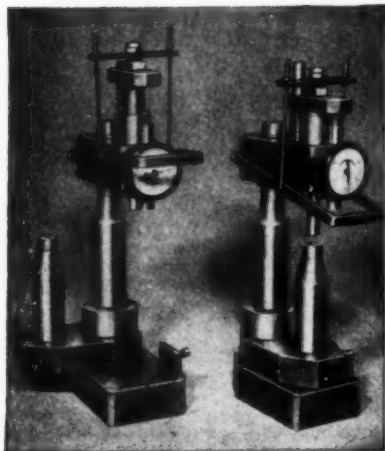
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THICKNESS,
HEIGHT,
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and *Special*
Measurements**



HIGH-SPEED •

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• DURABLE •



This high-speed, durable, and accurate gauge enables you to take readings of variations as small as .0001". Each individual depth and length dimension can be checked visually, and errors determined. No expensive or complicated measuring equipment is required either for checking or setting. A simple master setting gauge supplied with each SUN DIAL INDICATOR GAUGE provides a quick and dependable method of setting and checking. These instruments are being used in inspection rooms and on production lines by ordnance manufacturers working for the U. S. Army, Navy and Airforce. *Descriptive folder will be sent you on request—no obligation.*

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HYBCO TAP GRINDERS



**For Sharpening
CHAMFER - FLUTES - SPIRAL POINTS**

CAPACITIES:

Machine Screws to 1½" hand taps.

*Can be arranged for any number of flutes
—right or left hand.*

ALL TAPS HELD BY SHANK.

*Can be sharpened after center is destroyed.
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I have previously mentioned wet belt grinding as a method which has been given great impetus as a result of the demands of the war effort.

These machines are all similar in design and consist basically of a vertical abrasive belt grinder with suitable spray equipment shielded effectively to control the splashing of water or other lubricants. Naturally, they call for the use of water-proof abrasive cloth belts.

All such machines have provision for direct water connections and are also designed so that a pump can be installed for recirculating purposes if water soluble oils or other commercial lubricants are used. This eliminates waste of lubricant.

The principle of wet belt sanding with a suitable lubricant makes it possible to grind to much closer tolerances as loading of the abrasive surface and frictional heat are eliminated. Consequently many operations, formerly accomplished on millers, planers and similar machines can now be wet belt sanded in a fraction of the time.

This has necessitated the manufacture of water-proof abrasive cloth which, when made into belts, is fast-cutting, uniform, rugged, and water resistant. Such belts are now available in 19 grit sizes. This range provides a suitable abrasive for any requirement, from the roughest stock removal job to the finest finishing operation using, in some cases, grits as fine as No. 600.

A typical example of the work that can be produced by wet grinding was provided recently by a manufacturer of intricate aluminum alloy castings. The original specifications called for milling two surfaces of these castings to close tolerances so that each surface might fit its counterpart without the use of a gasket. Grinding on a wet belt running over a hardened steel platen, these parts were finished in less time than it previously took to set them up for the milling operation, and were held to a tolerance .0005".

Not only aluminum and aluminum alloys lend themselves to waterproof abrasive cloth belt grinding, but also carbon and alloy steels, including stainless steel, ceramics, glass, rubber, plastics and almost any substance which, when sanded dry, produces excessive frictional heat, distortion or loading.

ONE OF A SERIES PORTRAYING THE "SPEED NUT FAMILY OF FASTENERS"

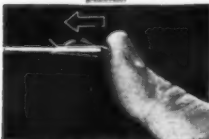
"U" TYPE
SPEED NUT

HERE'S THE NUT THAT

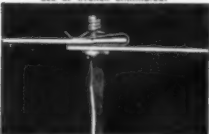
Holds itself
IN PLACE!



As "U" nut is slipped over panel, extrusion on lower leg snaps into hole—locking nut in screw-receiving position.



With second panel in place, screw is driven into "U" nut. Access to opposite side is unnecessary and use of wrench eliminated.



Here is a spring steel lock nut that broadens the smile of engineers and assemblymen everywhere. No more fussin' or cussin' over blind location fastening problems. No more expensive welding, riveting, or clinching nut plates in location. For "U" type SPEED NUTS merely snap into holes along the edge of panels, brackets, or flanges.

An extrusion formed in the lower leg of the "U" nut snaps into the screw hole and retains the nut in perfect register until final assembly. By varying the size of the hole, any degree of "float" may be obtained, to compensate for misalignment.

In addition to simple and speedy

application, "U" type SPEED NUTS possess exceptional holding power and their arched prongs absorb vibration to definitely prevent loosening. Millions of "U" nuts were used on metal, wood, and plastic products before the war—millions more are being used today on war equipment. And post-war products that will capture the biggest markets will be assembled faster and at lower costs with SPEED NUTS. The men with the assembly "know-how" are the ones who move up the fastest. Write today for literature.

TINNERMAN PRODUCTS, INC.
2107 FULTON ROAD, CLEVELAND 13, OHIO

Speed Nuts^{*}
PATENTED *Trademark Reg. U.S. Patent Office
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There's no guesswork about the strength of vise castings at Parker! The mixing of the iron by careful weighing and analysis, plus 100 years of experience, and *constant control in our own foundry* makes the strength of Parker Vises a sure thing. That's a big reason why your Parker Vise "Grips Like a Grizzly". The Charles

Parker Company,
Meriden, Conn.



PARKER VISES

America's Oldest

The rapidly increasing use of all these machines—swing frame belt grinders, idler backstands, and wet grinders—has been aided by the leading coated abrasive manufacturers developing improved material for these specific purposes. Depending upon the ultimate use, cloth backings are provided in various flexibilities; mineral coatings are controlled either electrically or otherwise to provide just the proper cutting surface, whether the job be the rapid removal of metal by a coarse grit, or its ultimate finishing by means of super-fine sizes.

The manufacturers of abrasive cloth have also provided many ingenious forms generally known as abrasive cloth "gadgets" for use on portable, high-speed machines originally designed for other purposes, such as the Portable Electric Die Grinder. Spirabands, which, as the name indicates, are spirally wound abrasive cloth bands supported by an additional cloth interlining; Spirapoints, conical shaped rolls to fit in varying radii; pre-molded discs to fit "mushroom" rubber pad for finishing hollows or depressions in dies, are among the better known forms by which the war effort has been speeded.

A new small belt sander which has met with enthusiastic acceptance is one that can be mounted on a work bench and employs coated abrasive cloth belts in much the same manner as a band saw. Depending upon the size or contours of the work finished on these machines, belts may be obtained from $\frac{1}{4}$ " in width up to 1".

These machines provide a very rapid means of grinding and finishing the outside and inside surfaces of many small parts which were previously hand sanded or filed. A parachute buckle is an example.

The tremendous demands for production created by our war effort have clearly demonstrated the versatility of coated abrasives as a modern, efficient cutting tool when used on properly designed machines. As manufacturers of coated abrasives, Behr-Manning is always ready to furnish information and help, not only concerning the use and applications of coated abrasive materials, but also to assist in the designing of special machines or equipment to use coated abrasives.

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The rapidly increasing use of all these machines—swing frame belt grinders, idler backstands, and wet grinders—has been aided by the leading coated abrasive manufacturers developing improved material for these specific purposes. Depending upon the ultimate use, cloth backings are provided in various flexibilities; mineral coatings are controlled either electrically or otherwise to provide just the proper cutting surface, whether the job be the rapid removal of metal by a coarse grit, or its ultimate finishing by means of super-fine sizes.

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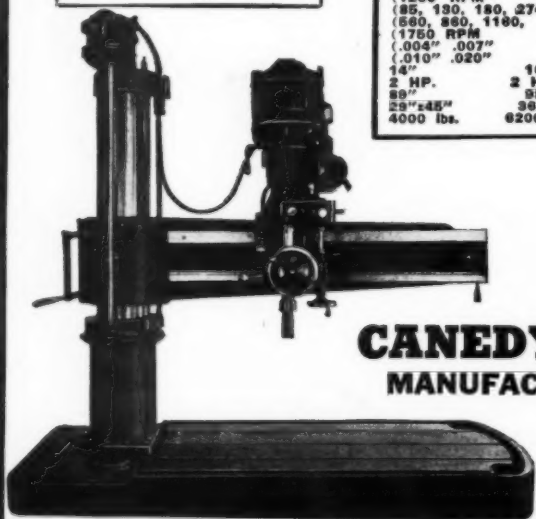
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SPECIFICATIONS:

Drills to the center of circle on base or table
Length of arm
Greatest distance from spindle to base
Minimum distance from spindle to base
Minimum distance from spindle to column
Traverse of spindle
Hole in spindle—Morse Taper
Diameter of spindle at nose
Traverse of head on arm
Traverse of arm on column
Spindle speeds with 1200 RPM motor

Spindle speeds with 1800 RPM motor

Feeds per revolution of spindle

Bearing of arm on column
Size of main driving motor
Height of drill column over gears
Working Surface of Base
Net weight

9" Column 3' Arm	11" Column 4' Arm	15" Column 5' Arm
73 1/2"	90"	120"
5"	4"	5"
43 1/2"	48"	48"
9 1/2"	15"	17"
10 1/2"	10"	10"
9 1/2"	8 1/2"	8 1/2"
No. 4	No. 4	No. 4
2 1/2"	2 1/2"	2 1/2"
25 1/2"	36 1/2"	48 1/2"
21 1/2"	24"	22"
(60, 85, 130, 180, 425, 560, 860, 1200 RPM		on all models
(85, 130, 180, 274, 560, 860, 1180, 1750 RPM		on all models
(.004", .007", .010", .020"		on all models
14"	16"	18"
2 HP.	2 HP.	2 HP.
80"	95"	95"
25"x45"	36"x60"	36"x85"
4000 lbs.	6200 lbs.	7000 lbs.

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OF IRREGULAR SHAPE
In TUBULAR PIECE
From ONE FLAT MASTER

SIX Operations
Completed on ONE
Machine in 40 Min.,
Floor to Floor

Gorton Tracer-Control Duplicating provides a simple, fast and accurate means for machining irregular shapes in parts like this Bronze Reel sleeve shown above. Specifications for this job called for an orifice on opposite sides of the sleeve.

Both orifices required a rough, semi-finish and finish cut—the latter with a $\frac{1}{4}$ " diameter end mill to produce $\frac{1}{8}$ " radii at the two corners. Only one set-up is necessary to complete the six operations (3 cuts around each of plate the six orifices) accomplished with a high degree of uniform accuracy, in 40 minutes, floor-to-floor time.

The simplicity of Tracer-Controlled operation permits even the most difficult work to be accomplished by inexperienced help.

NOTE—Time greatly reduced in other plants by using a battery of six or more Gorton Duplicators in multiples of three (1 for each cut) eliminating ALL cutter change.

JOB IN BRIEF

Operations—Rough, Semi-finish and Finish Milling of TWO irregular shaped sleeve orifices.

Material—Bronze.

Cutters—(only 3 needed)—Four-flute, fast spiral end mill, $\frac{3}{8}$ " diameter, two End Mills, $\frac{1}{8}$ " and $\frac{1}{4}$ " diameter.

Speed—1900 r.p.m.

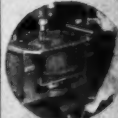
Feed—Manual.

Production—40 minutes per sleeve.

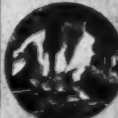
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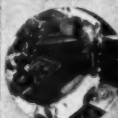
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for Every Job...
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in size



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WOODRUFF KEY SEAT CUTTERS

SHANK TYPE



High Speed — Right Hand — 1/2" Shank

American Standard No.	Old Standard No.	Diam. Inches	Thickness Inches	Length Overall Inches	List
*****	201	1/4	1/16	2-1/16	\$3.50
*****	206	5/16	1/16	2-1/16	3.50
*****	207	5/16	3/32	2-3/32	3.50
*****	211	3/8	1/16	2-1/16	3.50
*****	212	3/8	3/32	2-3/32	3.50
*****	213	3/8	1/8	2-1/8	3.50
*****	204	1	1/16	2-1/16	2.80
304	2	1/2	3/32	2-3/32	2.80
305	4	5/8	3/32	2-3/32	2.80
404	3	1/2	1/8	2-1/8	2.80
405	5	5/8	1/8	2-1/8	2.80
406	7	3/4	1/8	2-1/8	3.10
505	6	5/8	5/32	2-5/32	2.80
*****	61	5/8	3/16	2-3/16	2.80
506	8	3/4	5/32	2-5/32	3.10
*****	91	3/4	1/4	2-1/4	3.10
507	10	7/8	5/32	2-5/32	3.40
606	9	3/4	3/16	2-3/16	3.10
607	11	7/8	3/16	2-3/16	3.40
*****	12	7/8	7/32	2-7/32	3.40
608	13	1	3/16	2-3/16	3.80
*****	14	1	7/32	2-7/32	3.80
*****	152	1	3/8	2-3/8	4.20
609	16	1-1/8	3/16	2-3/16	4.20
807	A	7/8	1/4	2-1/4	3.40
808	15	1	1/4	2-1/4	3.80
*****	17	1-1/8	7/32	2-7/32	4.20
909	18	1-1/8	1/4	2-1/4	4.20
*****	19	1-1/4	3/16	2-3/16	4.60
*****	20	1-1/4	7/32	2-7/32	4.60
810	21	1-1/4	1/4	2-1/4	4.60
811	22	1-3/8	1/4	2-1/4	5.00
812	24	1-1/2	1/4	2-1/4	5.50
1008	B	1	5/16	2-5/16	4.00
1009	C	1-1/8	5/16	2-5/16	4.40
1010	D	1-1/4	5/16	2-5/16	4.90
1011	23	1-3/8	5/16	2-5/16	5.40
1012	25	1-1/2	5/16	2-5/16	5.90
1210	E	1-1/4	3/8	2-3/8	4.90
1211	F	1-3/8	3/8	2-3/8	5.40
1212	G	1-1/2	3/8	2-3/8	5.90

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EYEBOLT AND DOUBLE LINK AID IN STORING OF LATHE CHUCKS

A lathe chuck stand, devised by the Supercharger Division at General Electric's Lynn River Works, facilitates storing of parts after use.

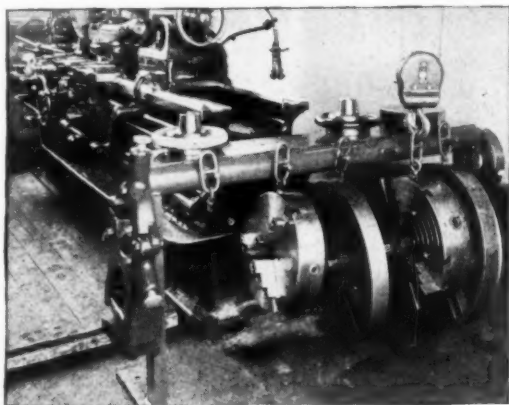
The compact stand, usually set at the end of a lathe where it will be handy for use in storing lathe chucks, face plates, steady rests, and dog plates, comprises two channel steel uprights, approximately $3 \times 1\frac{1}{2} \times 27$ ". Each is fastened vertically to a $\frac{3}{4}$ " base plate, 24" long and 4" wide. The two uprights, with two 4" pegs, are connected by a 3" pipe carrying five pegs. An 8" shelf, cut from $\frac{1}{4}$ " stock and supported by triangular-shaped gussets, is attached to the back and top of this pipe. For convenience of holding various chuck tools, 16 holes of 1" diameter are drilled into the shelf.

The main feature, used in connection with the stand, is the combination double link and eyebolt. The eyebolt may be screwed into the chuck or other tools to be stored. The double link, about 5" long and 2" wide, is used for raising and storing the parts. Upper part of the link is used for the crane hook, and bottom part can be guided by crane operator so that it hooks onto one of the pegs on the stand.

LINCOLN ELECTRODE HOLDER

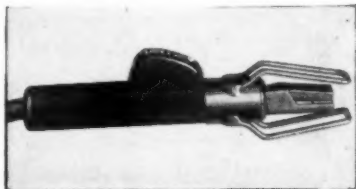
A new holder for welding electrodes, weighing 22 ounces, has been announced by The Lincoln Electric Co., Cleveland, Ohio.

Having a current rating of 300 amperes with ample capacity for overload, the



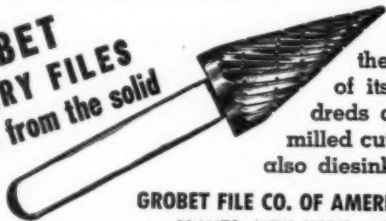
new holder will handle various sizes of electrodes ranging from $1/16$ to $1/4$ " diameter inclusive.

Jaws, made of high conducting and wear resisting copper alloy known as "Lincalloy", are claimed to withstand



rough treatment and are fully guarded from contacting the work by durable

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ROTARY FILES
ground from the solid

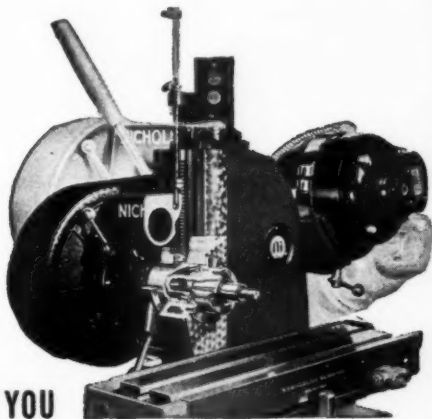


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dreds of rotary files hand cut,
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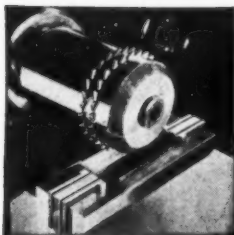
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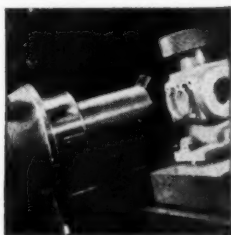
THE *BUSY* MILLER



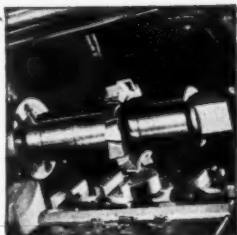
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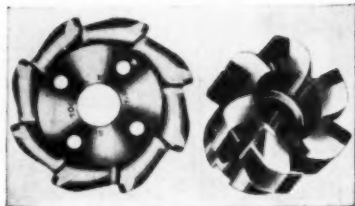
spring steel insulating guard that is easily replaceable. Trigger of holder is of molded, heat-resisting inorganic material.

Other features include:—hollow, air-cooled, heat-resisting fibre handle, excellent balance and equally good performance on both a-c and d-c current. The holder is designed to hold the electrode securely at any angle yet permit quick and easy change of rods.

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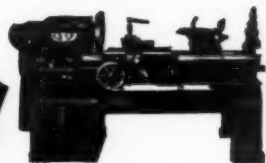
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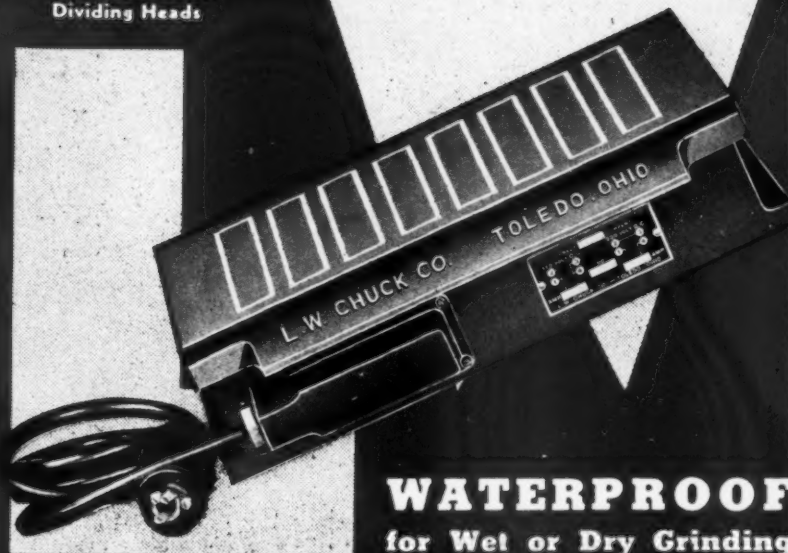
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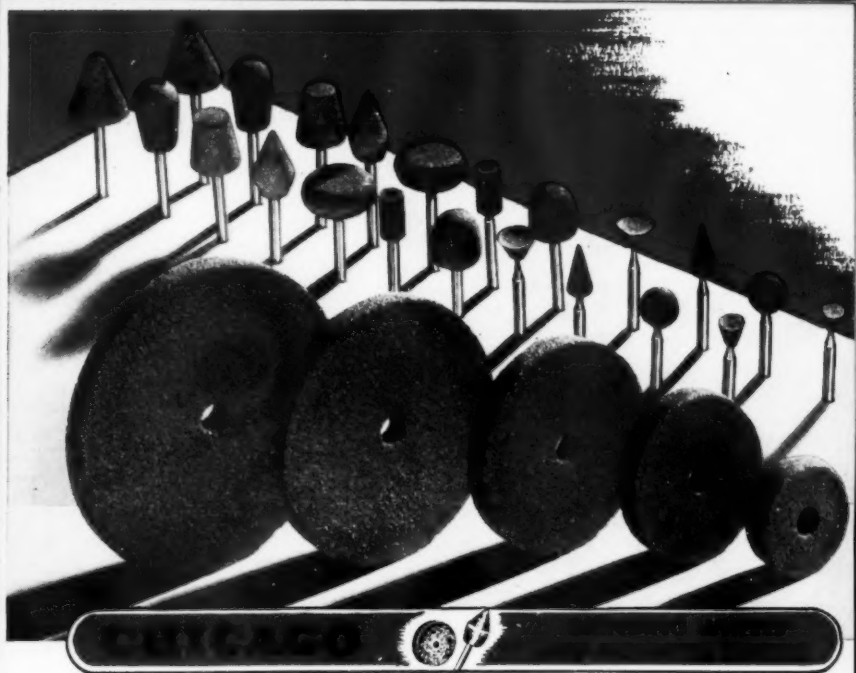
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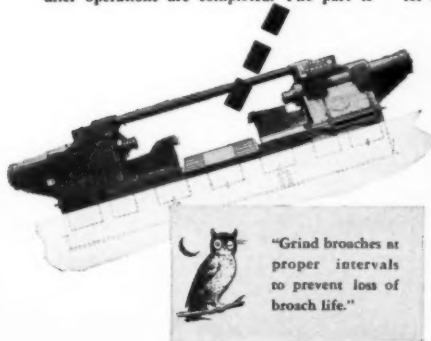


NEWSWEEK of August 28 reports of Lieut-General George S. Patton, Jr., as follows: "If he had to choose between tanks and bulldozers for an invasion he would choose road-building equipment every time." More than a construction machine, the bulldozer has been a powerful factor in winning many battles.

To quickly, efficiently fit axle shafts and bearing cups into bulldozer transmission cases, American engineers designed a special horizontal assembly press. A conveyor line brings the cases to the machine and removes them after operations are completed. The part is

stopped, locked in position, pressed, and released by this hydraulically operated, push button controlled machine.

This is another example of how the American Broach and Machine Company help leading manufacturers increase output of vital war materials. When the war job is done, American's complete service of machines, tools, and engineering will be available to speed manufacture of civilian goods. Let American engineers show you how broaching or special machinery can solve your production problems. Write today for details.



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The ART of METAL Cutting

PART II—TANTALUM AND TITANIUM CARBIDES AS CUTTING MATERIALS

TUNGSTEN carbide, introduced commercially to American industry in 1928, raised the speed of cutting iron from 75 feet per minute to 300. This same material also was used for the machining of such non-ferrous materials as aluminum at rates up to 1500 surface feet per minute.

But tungsten carbide was not successfully used in the machining of steel and its harder alloys. Inevitably then, the search for a suitable cutting material was begun feverishly soon after tungsten carbide was introduced.

Tantalum carbide was the first variation to be introduced in 1931. This cut-

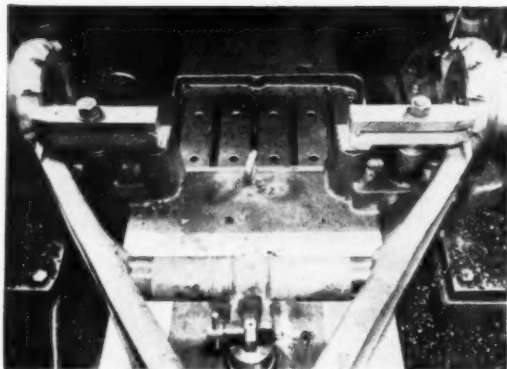
ting metal is a product of powder metallurgy technique, tantalum (along with some tungsten) in the powder form being compressed with carbon powder and then subsequently sintered or heated to high temperatures. In this sintering phase, the cobalt and other "binders" go into a plastic state sufficient to cement together the crystals of tantalum, tungsten and carbon.

In such machine tools as lathes, planers, shapers, boring mills and bars using single point tools, tantalum carbide successfully machined steel at higher rates. The increase was noteworthy, running as much as 150% over the rates possible with

Eight inch diameter carbide-tipped slotting cutter milling SAE 4340 steel at 25" per minute. With h.s. steel slotting cutter, rate for this same operation is 2" per minute.



Duplex milling operation on airplane land strut. With carbide tipped cutters, the feed rate for milling steel, heat treated to 360 B.H.N., is 18" per minute. With h.s. steel face mills, rate is 1½" per minute.



high speed cutting steels. But it, too, had definite limitations in the milling of steel. In fact, there was no advantage to be derived from using this material (tantalum carbide) as a cutting tool in a milling machine. Neither tungsten nor tantalum carbide has the "staying" power in a cut-

ter having a plurality of cutting points or blades. The milling process, with its continuous cutting technique imposes a severe strain on any cutting material. And these carbides, introduced in the early years of the "thirties" were not practical or economical for the milling

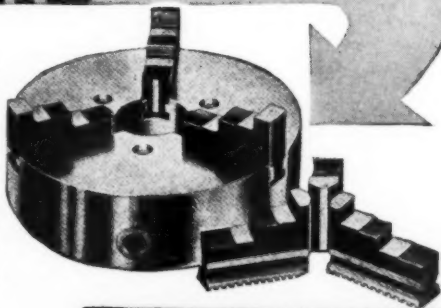
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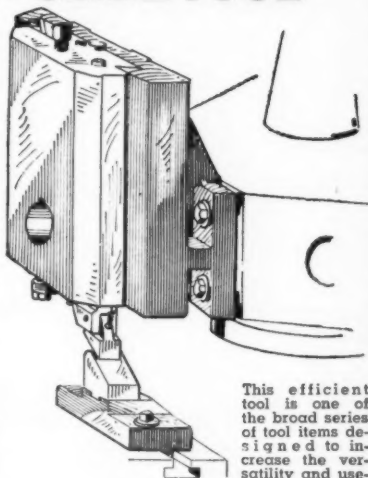
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This vertical slide tool is designed for the special purpose of cutting a recess in an internal diameter at any predetermined location. The shaped cutter is carried by a bar held in the hole of the slide. When the cutter reaches the proper location, at end of turret movement, the slide is raised by a cam block carried on the cross slide of the machine and makes the cut while the turret feed dwells at that point. When the cut has been made to desired depth, the cam block releases slide and cutter drops down to its original position.

This tool is also used for taper boring, taper turning or crown turning, such as on pulleys, etc. When used on work of this kind, the tool slide is actuated by means of a former plate or cam fastened to cross slide base or to bracket on overhead pilot bar.

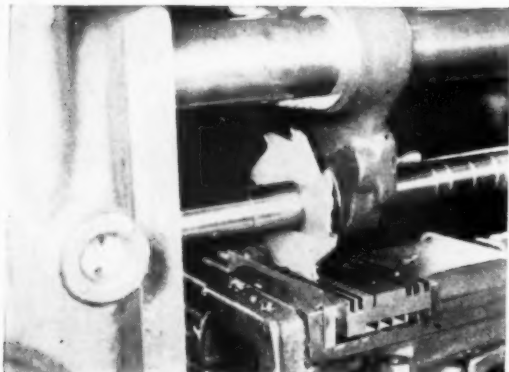
This tool is carefully designed and constructed for its special purpose, with rugged proportions adapted for accurate cuts.

Detailed dimensions and specifications are included in this helpful new catalog. If you use Potter & Johnston machines, many of the new tools illustrated and described will help you to reduce costs and speed production. May we send you a copy today—no obligation?

This efficient tool is one of the broad series of tool items designed to increase the versatility and usefulness of Potter & Johnston automatic turret lathes.

**The POTTER & JOHNSTON
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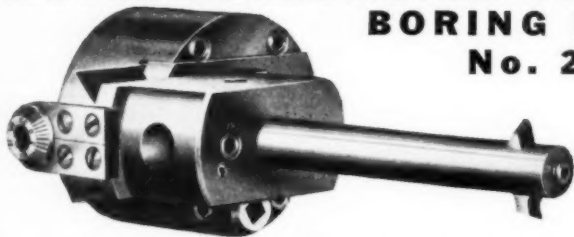
This carbide tipped slotting cutter slots at 21" per minute (slot is $\frac{1}{4} \times \frac{3}{4}$ "). Feed rate in 4130 material is 10 times faster than with h.s. steel.

of steel and its alloys. This represented a definite limitation, considering the widespread and necessary milling of steel and steel alloys, and a limitation, therefore, that was bound to be considered as a challenge to inventive ingenuity. It was not long before this challenge was met

and with one of the most dramatic answers in all the history of power manufacturing.

About the year 1938, titanium carbide, so-called, was given to industry as a cutting material for steel and the harder alloys. This new carbide, new in various

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The number 20 Micrometer offset boring head is of special dovetail design with two tension gibs. This head is especially designed for offset boring or facing.

The tool block has an offset of $1\frac{1}{2}$ " and will hold boring bars or tool perpendicular or parallel to the face of the head.

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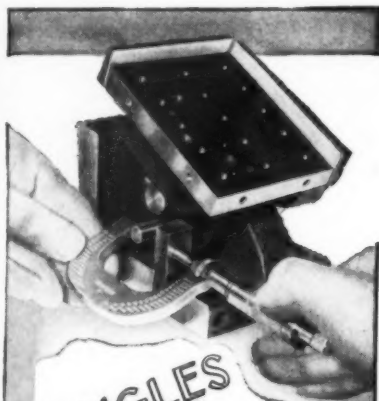
will cut tool costs. A saving of at least 40% (some users report 75%) with this removable taper shank tool driver. It is used with taps, drills, countersinks, reamers, end mills, center drills, counterbores, woodruff cutters, etc. The sleeve is a two jaw collet in action, fitted over the diameter of the shank of tool, which is positively driven by slots or the tang on shank end.

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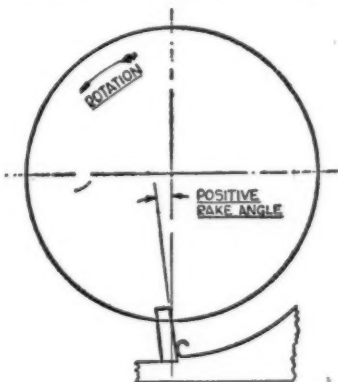
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Positive and Negative Rake Angle
with respect to Direction of Rotation.



Cutting Operation while using
Positive Rake Angle and indicating how
tip is directly stressed.

respects that will be considered shortly, was immediately found suitable, not only for single point tools such as are needed in a lathe or boring mill, but at long last in a milling cutter having two or more teeth, blades or cutting edges. The results to be enumerated at length in the proper place in this discussion are truly miraculous. But first, the nature of this cutting-metal should be considered.

Titanium carbide, as it is frequently referred to, is in reality a chemical com-

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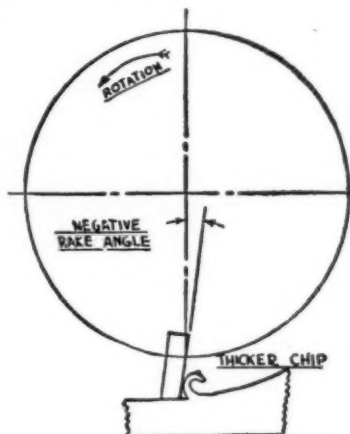
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position whose formula is $W Ti: C^2$, or Tungsten (W), Titanium (Ti), and Carbon (C). This is as much a chemical composition as H^2O or H^2SO^4 . It follows that this composition has higher melting points, higher hardness numbers, greater break strength, etc., than a physical union composed of these three elements and forced under high pressure, according to the powder metallurgy technique, into a solid and usable mass. The crystals of $W Ti C^2$ are powdered, mixed with the powder of WC or Tungsten Carbide and these two, after the application of pressure and heat, are formed into a material that is not only extremely hard but relatively strong.



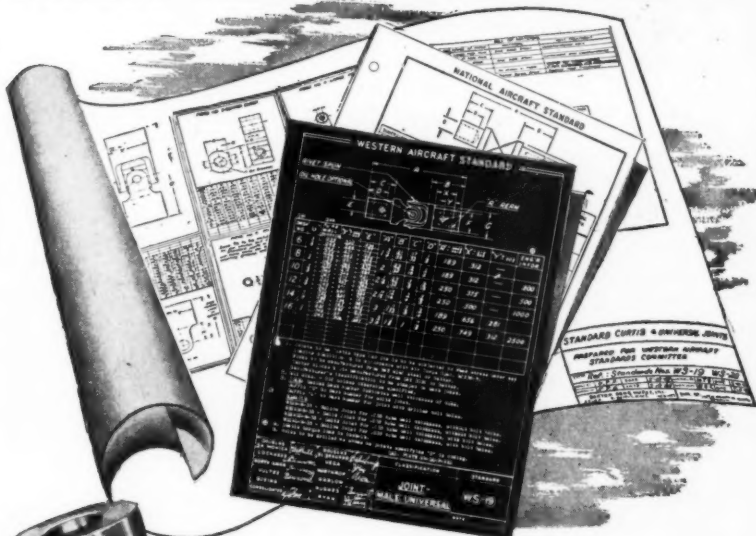
Cutting Operation while using Negative Rake Angle and indicating how tip away from cutting edge is under greatest pressure.

This carbide is successfully used, not only in single point tools, as in the lathe, but also in milling cutters. Its use, for really astounding results in the milling machine is, however, combined with a technique of cutting angles that is also an innovation and in some measure, wholly contrary to what has previously been considered orthodox and sound metal cutting practice.

In the traditional method of cutting metals, the so-called positive angle is

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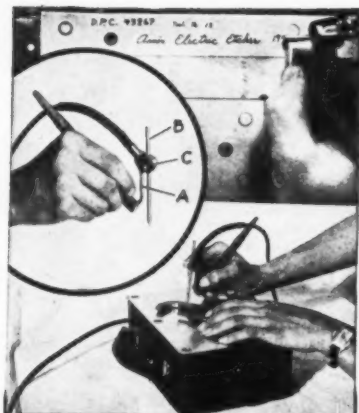
Hundreds of machine tool builders have found that these joints, either single or double in any of 14 sizes, stand up under continuous operation of such equipment. Joints must be tough. Special steel alloys developed through years of Curtis production ex-

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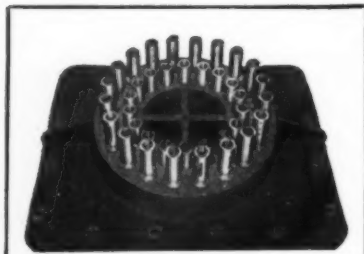


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used. This can best be understood by referring to the well known chisel, the angles of which are positive. Its action is like that of a wedge lifting the metal to be removed from the workpiece. Until quite recently, the wedging-off of the metal from a workpiece was considered not only the best but the sole method of metal removal or cutting.

In the new technique, the negative angle, combined with high speeds, **pushes** rather than **wedges** the metal off. Thus, if the angle of the chisel with respect to the workpiece is reversed, something like the action of the negative angle in a milling cutter is imitated. At first glance, this seems not only illogical but impossible. It is certainly contrary to all the knowledge of metal removal that industry has cherished for 150 years. But if these negative angles are combined with high speeds, to be explained subsequently, the business of removing metal is not only made possible but is actually raised into brackets of speed that seem fantastic. Yet the process is now, after a few hectic and feverish years of experimentation, not only accepted but definitely an established method and technique.

In the traditional method of milling, the rate at which a cutting edge was revolved in a cutter, (referred to as the surface foot rate) was hardly ever more than 80 feet per minute. The range commonly used with blades of high speed steel used in a milling cutter ranged from 60 to 80—seldom higher than 90. According to the new technique, using negative angles, the surface foot rate is seldom lower than 600—the range is from 400 to 800 feet per minute. And some operations are currently being performed at surface foot rates well over 2,000 feet per minute. Indeed, one operation of a regular shop production character, and well known to production specialists in its field, is at this moment being carried out at a rate of 3,500 surface feet per minute.

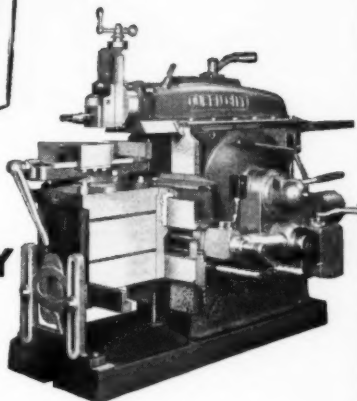
Thus, the number of feet traveled by a cutting tool on the periphery or circumference of a milling cutter is traditionally set at, on the average, 60 feet per minute. In the highest bracket of speed already mentioned, this has been increased as much as 50 times and over. The average increase is, however, around 10 to 15

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times—an increase that is truly astounding and one that will have a profound effect on our entire economy, particularly in the post-war period.

The rate at which the workpiece is fed into the milling cutter (referred to as the feed rate) has likewise been increased correspondingly from a few inches per minute to as much as 50 and 60 inches per minute where the power in the machine tool is available. The milling of such commonly used steels as the SAE

4340 series or the Chrome Moly alloys is being accomplished currently at the rate of 35" per minute in milling machines suitably powered and constructed. Formerly, this material was milled at 4 to 6" per minute—a rate that was considered "fast" milling. And, it must be remembered that such procedure is still being widely used.

And it must be remembered that such procedure is not only still being widely used, but that the new technique where used, is hardly more than two years old.

Production rates can, therefore, be increased easily by as much as five and even 10 times. Few changes, if any, in the equipment are necessary. What was formerly accomplished on a five hp machine is now transferred to a 15 hp machine; where the latter power (15 hp) was required by the traditional method, machines some specially engineered for this purpose, equipped with 20 and even as much as 50 hp are necessary.

A coolant is always used with the older procedure. This is necessary because of the heat generated and the necessity for removing or dissipating the heat to prevent distortion of the workpiece and damage to the cutter. With negative angles, and the latest high speed method, no coolant is necessary. All of the heat, or at least most of it goes into the chip and little if any into the workpiece. Thus, an expense item is eliminated, but particularly a source of messy and sloppy operation.

The actual cutting pressures with negative angles are somewhat higher but not sufficiently so as to make necessary a redesign of fixtures or holding devices.

In one meteoric flash, the rates of cutting metals have increased 10-fold and more. In another manner of comparison, it is now possible to produce 10 pieces of a product where only one was produced less than two years ago.

In subsequent expositions, striking examples, particularly of current war material production in which exact production increases have resulted over the older technique, will be set forth.

(Data supplied thru courtesy, Research Dept., Wesson Co., Detroit (20) Mich.)

(To be Continued)



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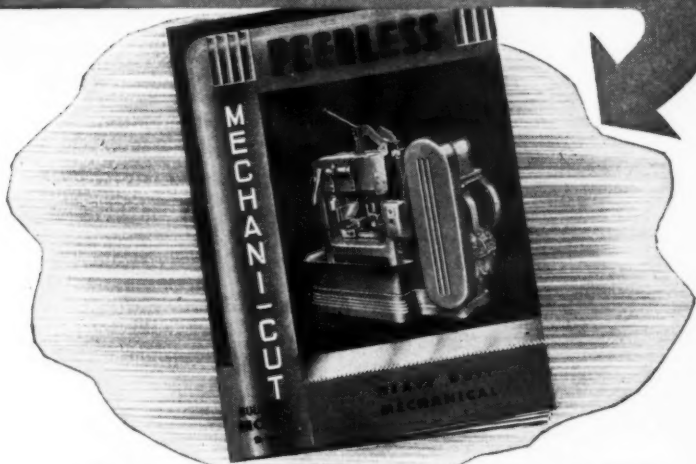


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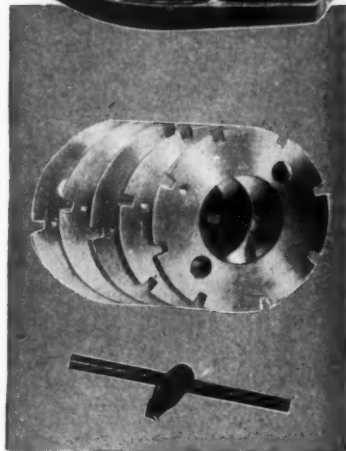
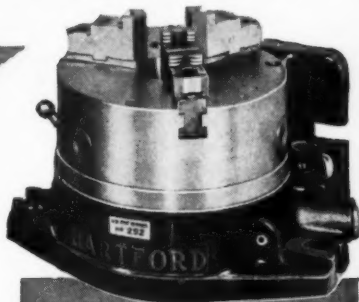
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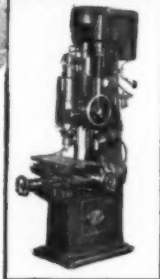
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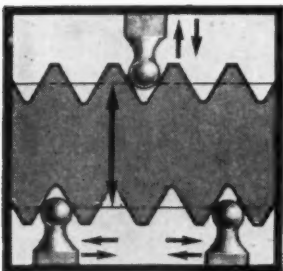
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YOUR TAX PROBLEMS

CHANGING ORGANIZATION FORMS

By ARTHUR ROBERTS

BECAUSE of crushing taxation, many businessmen are mulling over the desirability of changing their forms of organization, from corporations to partnerships or individual ownership and vice versa. The objective, of course, is to save on taxes. Such a change should not be made without due regard for all angles of the problem. Because the Internal Revenue Code is such a complicated affair, it may seem "at first blush" that a saving may be effected by such a change. However, certain regulations not taken into consideration at the time may appear later on and cause the taxpayer to pay more tax than he would have paid, had he kept the form of his business organization "as is".

One important factor that the taxpayer must not overlook when considering such a change is the provision in the Revenue

Act of 1942 permitting the taxpayer to carry back net operating losses for two years, beginning on or after January 1, 1942. If a net operating loss is not absorbed by the two-year carry-back, it may be carried forward for two years. It is possible under certain circumstances, that a business may not have a tax to pay for five or six years under the carry-over, carry-back provisions, which were written into the Code to enable the taxpayer to take credit for losses in loss-years, deducting same from gains in profit years.

Under prior regulations, the taxpayer was taxed in profit-years, paid no tax in loss-years, but got no credit for such losses. If he had one profit-year and one loss-year, earning \$20,000 profit one year and losing \$20,000 the next year, he really made no money in the two years, yet, he paid a tax on \$20,000 profit.

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This obvious injustice was corrected in the Revenue Act of 1942 with a limit of two years to carry-over or carry-back losses. If a taxpayer cannot absorb business losses in that time, he holds the bag for the left-over portion. Many criticize this time limit, contending that the tax is collected by the calendar, whereas, business operation covers a span of years and profit or loss is not a matter of yearly income and outgo but should be considered over the years a business has been in existence. Hence, the two-year limitation in the carry-back and carry-over provisions is unfair.

There is much to this contention, but, for the present, the law limits the credit to two years.

For example, a 1944 net operating loss may be carried back to 1942 and 1943 and if this carry-back does not absorb all the 1944 loss, the remainder may be carried forward to 1945 and 1946. As the years roll on, this same routine is permitted. Of course, if a business shows no losses, these provisions do not come into the picture but few businesses experience an unbroken run of profit-years. Loss-years come to pass and when all war costs are booked in the postwar period, there may be costs that were not apparent during the war. These may include forced obsolescence of machinery, which, in many cases, will only become apparent when new machines are marketed after the war. Or there may be experimentation in the early postwar days or a drop in volume until reconversion is completed. These may show losses during the year and many taxpayers may have to take advantage of this lift in the carry-over, carry-back provisions.

And now, back to our original theme. The taxpayer who changes the form of his business organization forfeits the right to carry back current losses to prior profit-years. Thus, if a user of machine tools converts to another form of business organization after a number of profitable years, then experiences, under the new order, one or more loss-years, he cannot carry back these losses and take credit against taxes paid in profit-years. The tax increases of the last few years have changed the picture considerably insofar as benefit to be derived from



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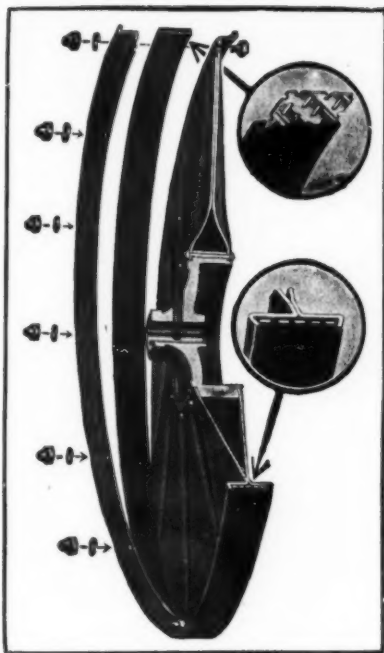
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change in organization is concerned. In some cases, it may work out to advantage but I believe that such a change-over should be made only after deep consideration of all tax factors involved because the trend in tax legislation has been to equalize the taxes paid by individuals and corporations. Numerous users of machine tools have inquired about the desirability of dissolving corporations and forming partnerships. Once upon a time, savings may have been effected by such a change in many cases, but today, it's a different story.

Working capital will be a big essential in the postwar tomorrow and tax refunds resulting from the carry-back, carry-over provisions in the revenue act may help the taxpayer substantially to maintain a satisfactory amount of "seed money", as working capital is called. He can't afford to jeopardize his postwar position with creditors, to minimize his efforts to do a satisfactory sales promotional job and to invest in modern equipment that will enable him to produce at the lowest possible cost. Modernization will be a big factor in the postwar period and postwar profits will go to those who are equipped with the latest developments in production machinery. That there will be many such developments is certain. Some will be radical departures from units now in existence—units that would have endured, from a mechanical standpoint, for many years, had there been no war to step-up engineering ingenuity and begot many improvements in productive goods. The plant-overhauling that industrialists must do in the postwar period will cost plenty and they will need more working capital than ever before, so take advantage of every opportunity to procure such funds. The taxpayer who changes the form of his business organization and thus forfeits the right to carry-back losses to a prior period may find that, even if he benefits in other ways, the tax refunds he forfeited, make the change-over mighty costly.

Credit men are paying more attention to the effect of high taxes on the financial standing and operating movement of a business. Any change in the type of organization will be carefully scrutinized when they analyze the credit-seeker's re-



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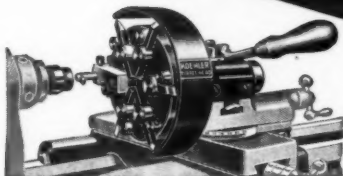
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quest for loans or other accommodations. Even the tax the businessman pays is now a subject of review by credit men because tax is a high fixed charge today. In days when the toll was light, credit men seldom brought this expense into their analyses but Uncle Sam has first call with this levy. Consequently, it will affect payments to other creditors and credit men want the lowdown. For this reason, the user of machine tools must keep tax expense under his spectacles all year 'round just the same as rent, depreciation and other overhead. He can't afford to forget it as he did in former years until March 15. He must consider the tax and its effect on every business transaction, whether he buys a new machine or seeks to change the type of his business organization.

There is a tendency to dissolve corporations at this time because of a feeling that tax savings may be effected by changing the form of business organization to partnerships or proprietorships. Before taking such a step, consider all taxes touching such a move; income, excess profits, capital stock, state income taxes on dividends and officers' salaries, franchise taxes, unincorporated business tax, Federal and state taxes on the income of partners, etc. Base your computations on the income earned during the war and expectations of earnings in the postwar period. Also consider the two-year carry-back of unused excess profits credits, which corporations are permitted in calculating excess profits tax. The unused credit for any taxable year may be carried back for two years. Many corporations will receive tax refunds from this source, which they would sacrifice upon dissolution.

The pay-as-you-go feature of the income tax law hits hardest on individuals and partners who must make estimated declarations, which take time and are more or less confusing because the whole procedure is based upon guesswork. Corporations, moreover, can hold onto their funds for tax payments for a full year more than individuals or partnerships. Proprietors and partners are obliged to settle up tentatively within the current year, whereas, the corporation pays during the following year. In some instances, stockholders in close corporations have

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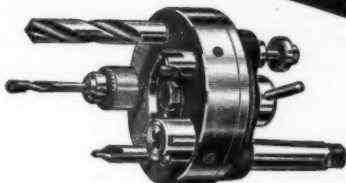


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turned in their charters and allotted part of the corporate capital to their wives and other members of the families, including them in the newly created partnerships. Because the transfers were substantial, the Treasury Department levied heavy gift taxes. Unless it can be proved in such cases that the recipients are really partners and give actual services or have invested money in the enterprises, the Treasury Department may decide that all income derived from the partnerships is taxable to those partners who were the original stockholders.

CONTRACT TERMINATION

TO DATE, the War Department has terminated more than 28,000 war contracts. Of this total, all but 4,000 have been settled. The great majority of the 4,000 contracts still unsettled are due to the individual contractor's failure to submit his claims to the War Department so the settlement machinery can be put into motion.



There is a certain amount of preliminary work necessary on the part of a contractor before his claims against the Government are ready for submission.

It is, of course, to the advantage of contractors and subcontractors to prepare themselves for contract termination and to submit their claims as promptly as possible, once termination has taken place.

There are a number of steps that a contractor or subcontractor can take to prepare himself for termination. A number of these are listed. All of them go under the head of Pre-Termination Planning:

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(a) He can avail himself of all publications (such as "The Contractor's Guide") that explain termination procedures. Copies of these publications are available from his local contracting officer.

(b) He can delegate a member of his organization to check Government Regulations on the subject of contract termination.

(c) He can attend awareness meetings such as those conducted by Chambers of Commerce, the Smaller War Plants Corporation and industrial groups.

(d) He can keep in close touch with his local contracting officer, especially on those individual problems that may exist in his particular organization.

(e) He can set up a termination group within his own company.

"THE FOREMAN'S GUIDE"

An interesting 28-page bulletin No. 66 entitled "The Foreman's Guide to Labor Relations" has been issued by the U. S. Dept. of Labor, Div. of Labor Standards, Washington, D. C.

The purpose of the booklet is primarily to provide the foreman with a background in the field of labor relations. It endeavors to help him in development of a constructive and flexible approach to the specific human problems which he meets in the course of daily departmental operations.

The Guide also strives to give the foreman a better understanding of the position he holds as direct representative of management in matters involving application of the company's labor relations program.

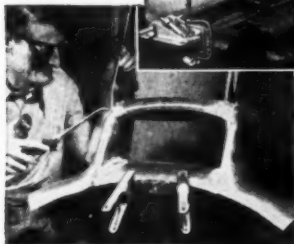
Single copies will be sent free of charge on request.

SHELDON ACQUIRES VERNON LINE

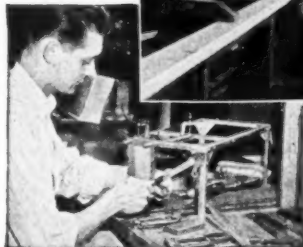
The Sheldon Machine Co., Inc., Chicago, builders of Sheldon Precision Lathes and Sheldon Arbor Presses, announce acquisition of the Vernon Line of Machine Tools. This line includes the well known Vernon Horizontal Milling Machines, Vertical Milling Machines and Jig Boreers, 12" Back Geared Shapers and Universal Tool and Cutter Grinders heretofore built and sold by the Machinery Mfg. Co. of Los Angeles, Cal. All manufacturing of these machine tools has been transferred to the Sheldon plant in Chicago where production will soon start to permit deliveries shortly after the first of the year.

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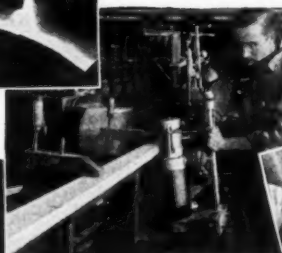
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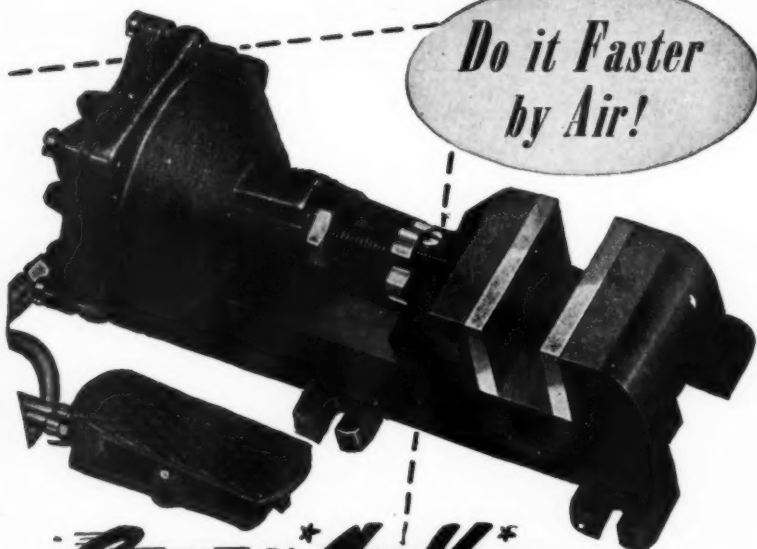


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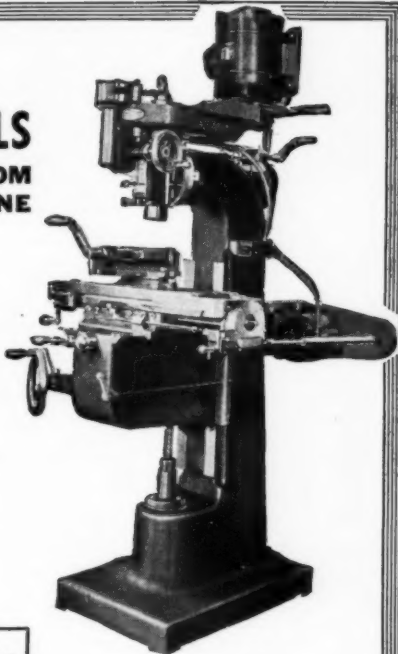
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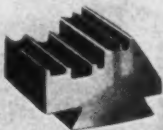
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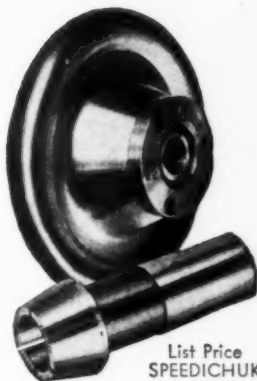
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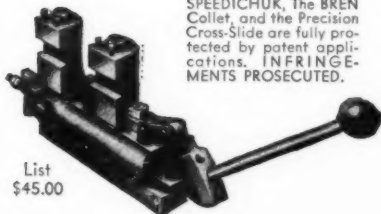
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POWER CYLINDER FUNCTIONS

By JOHN E. HYLER

GROWING appreciation of power cylinders, both air and hydraulic, and the remarkable part they have played in so many metal-working operations, is bringing both machine designers and machine buyers to the places where check-ups on cylinder applications are often made. Some of the advantages have received minor consideration.

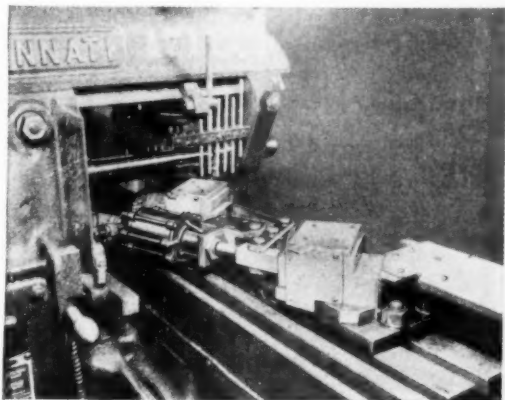
Take the proposition of noise. It is only of recent years that management has realized how much excessive noise has to do with fatigue of workers. If, then, a very noisy operation like riveting can be reduced to a relatively quiet operation without any sacrifice of production efficiency from other standpoints, a decided advantage has been gained.

It is a fact that in countless types of riveting, hydraulic riveters have eliminated the noise and, increased production efficiency from other standpoints. Hy-

draulic riveting machines, in both portable and stationary models, and in various sizes, have made remarkable production records, and have found wide application. One of the portable models weighs 54 pounds, develops 35,000 pounds pressure, and is commonly used for the cold heading of $\frac{3}{8}$ " rivets. In cases where such a machine is used steadily by one operator in one area, the tool can be suspended at approximate working level so that no unnecessary lifting is involved in handling it. Such machines are used especially on large assemblies which would be difficult to take to a riveting machine. For the handling of smaller jobs, the work is usually taken to a stationary type of hydraulic riveter. One stationary machine of duplex type, simultaneously cold-heading two $\frac{3}{8}$ " rivets, has shown a production record of around 1800 rivets per hour.

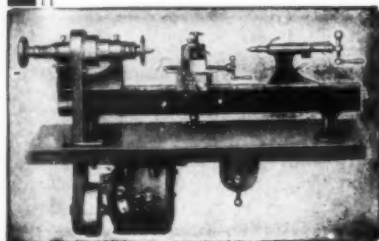
So well does hydraulic cylinder design lend itself to riveting, that different firms

This interesting application of a single Bellows air motor permits continuous operation of the milling machine without taking time out to load or unload the fixture. Two identical fixtures are toggled together. As table moves, operating lever of the air motor is actuated by a cam fastened to the back of milling machine. Advancing piston of the air motor operates the toggle, locking one fixture, unlocking the other. As piston retracts the operation is reversed. The milling cutter is climb milling on one end of the stroke with conventional milling at the other end.



THE "Stark"

PRECISION BENCH LATHES



With Motor Drive Unit
(9 Speeds)

Dependable for long service on exacting work which they handle with facility and speed. Records of 20 years continuous service are not unusual.

Write us your requirements. Now 4 good sizes, $\frac{1}{4}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ " and 1" collet capacity.

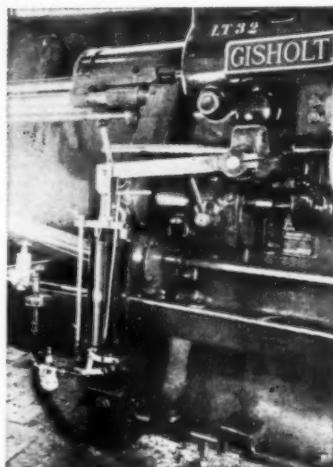
Stark Tool Company

Established 1862

Waltham, Massachusetts

Originators of the American Bench Lathe

who are specialists in the production of hydraulic cylinders, have also manufactured riveting machines, and are ready to design them to suit individual places and cases. Doubtless, the future will see incorporation of riveting cylinders into various machines and pieces of equipment where they have not as yet been used. It is a sure fact that the simple introduction of an air or hydraulic cylinder into a machine, where a straight-line motion either with or without pressure is desired, (not to mention motions readily derivable from a straight-line motion) will often eliminate expensive and complicated methods of arriving at the same result.



This interesting application of Bellows air motors to lock and unlock collets of large Gisholt lathes is reported to have made it possible to use women operators with practically no fatigue factor. Previously, handlocking required too much physical effort for women operators. The handle, which normally threw the collet, was replaced with another type, and end of the air motor piston was attached by clevis to this handle. Mounting for the air motor was made by the Company's own tool men. Special trunnion mounts for use with the air motors, however, are now available.

Recently, equipment for holding shells for various operations has been of par-



HERE IS A CUTTING-OFF BLADE READY TO USE !

Note All These Distinctive Advantages



T-shape provides liberal side clearance.
Excessive friction eliminated.



Tapered blades have back and side clearances full length of blade.

No resharping, but from face, required.



Hollow ground top causes chip to collapse and relieve friction against sidewall of cut.



Thus collapsed, the chip is drawn away from sidewalls and permits coolant to reach cutting edges of blade. Friction reduced. Blade life increased.



We have holders to fit any standard hand and automatic screw machines. Blades are locked in holders by two developed cams. Releasing of blades for resharping never disturbs initial setup. Efficiency of blades maintained till they are reduced to within one inch of their original length.

... and when we say "Ready to Use," we mean you can put it on your machine—on any standard automatic or hand screw machine—the minute you get it—and you're ready to go. You don't have to spend a second's time to grind in your clearances. They're already there—back and side—and besides, the top is hollow ground to collapse the chip and relieve the excessive friction.

TODAY, you don't have to buy a cut-off blade on which you must spend time to prepare it for use.

Send for Complete Catalog

Buy an EMPIRE TOOL COMPANY'S PATENTED CUTTING-OFF BLADE

No other cut-off blade offers the convenience in operation, the efficiency in performance, and the economy in use.

Our engineers located in principal cities will gladly call at your request to assist you in simplifying your cutting-off operations—save time and increase production.

Blades, both tapered and parallel on longitudinal cutting width, carried in stock. Shipped immediately.

BUY WAR BONDS

Also manufacturers of Empire
Flooding Tool Holders
and distributors of Rigid Live
Center, Fastcut
Centerdrills, and
Keyseat Cutters.

EMPIRE Tool Co.

8774 GRIMMELL AVE.
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THREAD-ALL Tapper



PRECISION TAPPING !! LICKED !!

By Converting Any Drill Press into
a Precision Tapping Machine.

Check these advantages:

Handles small taps without fear of breakage. Takes sizes up to 1½" with ease.

Gives precision tapping without need of lead screws.

Electro-magnetically controlled positive depth setting.

No adjustments required for tap sizes.

Silent forward and automatic high speed reverse action.

Taps right or left hand without adjustment.

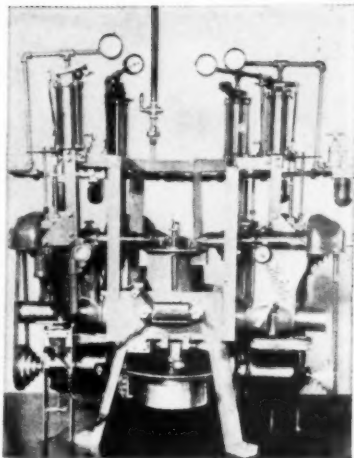
Machine may be used for drilling, reaming, counterboring, etc. without adjustment.

Write for full details.

GRUEN GAUGE CO.

10039 Marcus Ave.

Detroit, Mich.



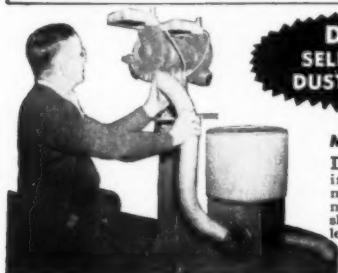
On this special multiple horizontal drill set-up, four Bellows drill press feeds, each equipped with a Bellows hydro-check are used to advance the spindles. Each feed is controlled by a solenoid, and all four feeds are synchronized to advance at a predetermined time point in the cycle. A light circuit is so arranged that when index fixture has traveled a complete 360°, both light bulbs, shown on front of the machine, glow, indicating that drilling is completed.

This control of the feeding rate is reported to have been so effective that No. 55 and 60 drills could be used with negligible breakage. Material drilled was stainless steel.

ticular interest. It is interesting to know that manufacturers of air and hydraulic devices have developed different holding devices for such purposes. And not only so, but power cylinders are being used on feeding motions. A certain modern shell bander has an automatic feeding device, operated by a power cylinder of special type. This particular cylinder, coming into wide use, is neither strictly "air" nor "hydraulic", but is really a combination of the two. It is so designed that compressed air is used for the power thrust, and oil is used for regulating and smoothing the motion. The cylinder is double-acting, and there are really four compartments in its interior. There is a heavy valve disk in the center of the



Quick way to STOP DUST!



DUSTKOP SELF-CONTAINED DUST COLLECTORS

MODEL 600

DUSTKOPS are installed in a few minutes. Flexible metal hose makes slip fit with dust outlets on grinder.



MODEL 950

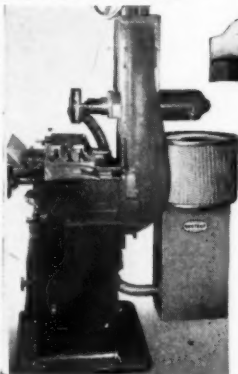
This unit, with dust hoods, "ready to go," fits any double-end pedestal grinder not already equipped with wheel guards and dust outlets.

DUST STOPPED ON ALL ABRASIVE OPERATIONS AT LOWEST COST

For quick, economical, effective dust control at the source, install DUSTKOPS. Easy to attach to surface grinders, disc grinders, cutter and tool grinders, flexible shaft grinders—or to buffers, sanders and abrasive cut-offs—whether single or multiple units. Large or small models available.

DUSTKOPS are compact and portable. Entirely self contained, with motor, fan, cyclone separator (in all but smallest models) and spun glass filter. Flexible metal hose permits quick installation.

DUSTKOPS clean the dust-laden air without wasting heat. Efficient cyclone separator provides low maintenance. Many other features make DUSTKOPS ideal for your shop or laboratory. Immediate shipment of "standard" voltage units.



MODEL 600

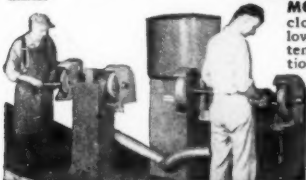
With flat, spun glass filter for compact bench installation. Pulls all dust from two grinder wheels.



MODEL 950—has cyclone separator, plus spun glass filter. For medium duty work of all kinds.



MODEL 1250—gets all dust and smoke from this heavy duty abrasive cut-off, at extremely low cost.



MODEL 950—with cyclone separator means low first cost, low maintenance, even on production surface grinder.

(Left)

MODEL 1250—one unit handles dust from four wheels.

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NOW
for Bulletins

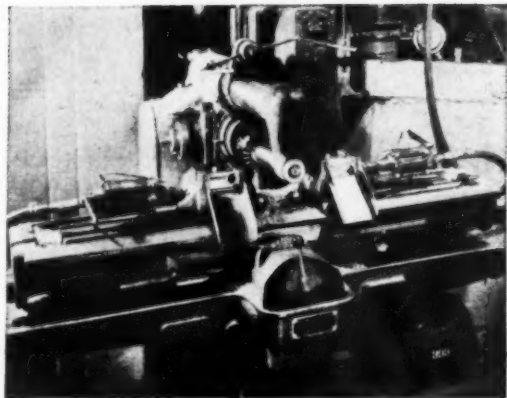
AGET-DETROIT COMPANY

605 First National Building • Ann Arbor, Michigan

Detroit Office: Tel. CADillac 3090

A slot .156" wide by $\frac{1}{16}$ " deep is being milled in half hard brass on this double acting mill. Five pieces are held in a special fixture and milled at one time. Operator loads one Bellows CV-40 vise while the second vise is under the cutter. Vise jaws are synchronized to open and close automatically with movements of mill table.

Production was increased to better than 600 per hour, as contrasted with 175 per hour with the old hand clamping method.



composite cylinder thru which the cylinder piston operates. On either side of this valve disk is an oil chamber, both chambers being normally full of oil, and provision is made for oil to pass from one to the other under the power of the

piston thrust. A ball check valve is provided in the valve disk so the oil may return freely on the non-working stroke of the piston.

Just as both the inner faces of both pistons in this composite cylinder are

"EXTREMELY FLEXIBLE"

The Baker No. 150 heavy duty box column single spindle Drilling Machine is designed for handling an unusually wide range of work.

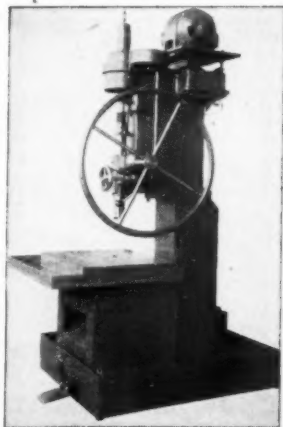
Machine was originally designed for drilling of test pieces 2" x 24" x 24". To accommodate these large pieces, distance from center of spindle to base of frame was increased to 14" instead of the standard 11 $\frac{1}{4}$ ".

Machine is equipped with 38" dia. handwheel instead of the standard capstan handle. Foot treadle provides convenient engagement of automatic feed.

Machine shown is of single purpose type. Standard universal machine with quick change of speed and feed can also be arranged with these special features.

Let us send further details.

BAKER BROTHERS, INC.
Drilling, Boring and Tapping Machines
TOLEDO, OHIO



MODERN SELF-OPENING STATIONARY TYPE DIE HEADS

Whatever your threading problem, MODERN has the practical, economical solution.

★ Wider threading range and greater flexibility. Unusually well adapted to general purpose, diversified threading work.

★ Carefully designed and built to provide the utmost in productivity and long-lasting, accurate service.

★ Made with the least parts, hardened and ground throughout, wear is held to a minimum.

★ Simplified design makes chaser change quick and easy without special tools.

MODERN Self-Opening

Die Heads thread diameters from $\frac{1}{8}$ " to 7" in standard heads and up to 14" in special heads, accurately, fast, and economically. Standard die heads and standard chasers can usually be shipped from stock. MODERN is prepared to meet your die head requirements for large and

small threading, and do it with satisfying promptness.

Write for Bulletin M-123.

MODERN TOOL WORKS

DIVISION OF
CONSOLIDATED MACHINE TOOL CORPORATION
ROCHESTER 10, NEW YORK

SHARPEN CARBIDE TOOL BITS —

Better and Faster



Diamond impregnated wheels in metal and resinoid bond. For free hand sharpening use coin forged metal bonded wheels—assures easy cutting—longer life. Our resinoid bonded wheels are unsurpassed for machine tool sharpening.



*Write for free
illustrated catalog.*



First award—
Industrial Diamonds
Southern California
Exposition
Los Angeles, 1944

WEST COAST DIAMOND TOOL CO.

11601 WILSHIRE BLVD., LOS ANGELES 25, CALIF.

Telephone: ARIZONA 3-3147

working in contact with oil, so the outer faces are in contact with compressed air—first one and then the other, to obtain the required double-action movement. Cylinders of this kind may be applied logically to the operation of machine slides, drilling heads, work holding tables, and various other controlled movements.

A very interesting hydraulic piston application is found on a modern camshaft grinder, where a roller, operating against a master cam mounted to revolve with the camshaft being ground, gives the necessary swing to the cradle on which the grinding wheel is mounted, to generate the profile of the master cam on the cam being ground. Since the various cams on the camshaft being ground have different radial positions, it is necessary to index the master cam after one has been ground, before beginning to grind the next one. In order to do this indexing, and also to obtain the necessary relative lateral movement between wheel and camshaft to bring it into position for grinding the next cam (without the wheel coming into contact with any cam during the shifting process) the cradle must be swung positively back a sufficient distance to allow these changes to take place without interference. A hydraulic piston is incorporated into the machine to swing the cradle back out of the way. After the indexing has been done, the cradle is pulled back into grinding position by hydraulically cushioned spring tension.

You may be well acquainted with hydraulic feeds as applied to machine tables, and yet not know that in some cases, cross-feeds of hydraulic type have been combined with hydraulic table traverses. This is true in the case of some surface grinders I have encountered. On one excellent machine of this type, the same pumping unit supplying oil for the table-traverse, draws oil from the same reservoir for operation of the crossfeed. In order to make the amount of crossfeed governable, an automatic metering mechanism is incorporated in the apron, the metering mechanism delivering the oil thru a telescopic pipe to a special valve on the vertical slide. From this point, the oil travels thru ports to a hydraulic cylinder on the under side of the vertical slide. The cylinder piston transmits the

PRESSUREMATIC

PRESSES ARE ENGINEERED FOR...

Power • Speed • Control

Select the ram travel, speed, and power you want. All are variable on the PRESSUREMATIC, the ideal press for assembling, press-fits, bending, straightening, die try-outs, and duplication of work pressures.

GOOD DELIVERY!



EXCLUSIVE AUTOMATIC PRESSURE CONTROL



Control may be set to reverse ram at any pressure, and automatically continue up and down stroke cycle until foot switch is released.

CONSTRUCTION DETAILS

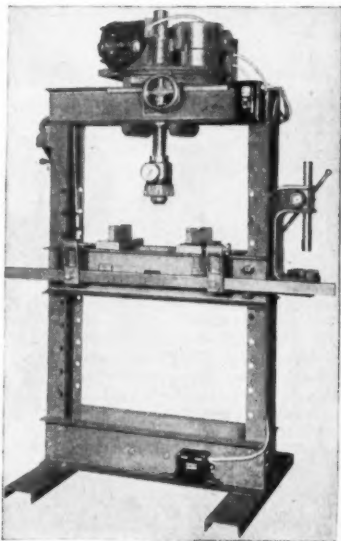
Adjustable bolster; movable ram head; re-set type hand switch; builds up from 0 to 60 ton pressure in 4 seconds! Many other exclusive features.

**20, 40, 60 TON ELECTRIC MODELS
40 AND 60 TON HYDRAULIC MODELS**

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NUMBERALL

Multi-Wheel Numbering Machine Model 70

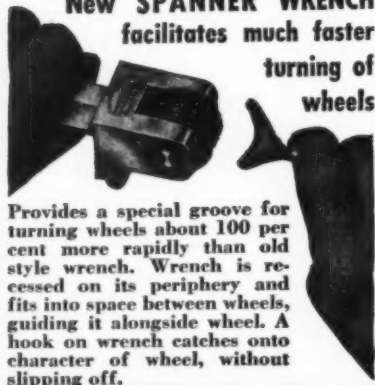


Model No. 70

The most efficient method of stamping numbers into metal. Repeats the same numbers until changed. Model 70 NUMBERALL Machines are used in all industries to mark various parts. Stamps numbers, etc., quickly . . . neatly. Perfectly aligned. Much better marks are produced by these machines than by single stamps or steel type, and at a far lower cost. Shank for Hand or Press and with any number of wheels from 3 to 20.

Write for
Bulletin BB-70.

New SPANNER WRENCH facilitates much faster turning of wheels



Provides a special groove for turning wheels about 100 per cent more rapidly than old style wrench. Wrench is recessed on its periphery and fits into space between wheels, guiding it alongside wheel. A hook on wrench catches onto character of wheel, without slipping off.

NUMBERALL STAMP & TOOL CO.
HUGENOT PARK STATEN ISLAND 12, N. Y.

power thus obtained to the wheel-slide. The crossfeed may be so governed with this device as to provide incremental feeding anywhere from 1/16 up to 1 1/2".

For the economical operation of air chucks, etc., which require mounting on revolving spindles, as in lathe practice, revolving air cylinders are used. Such revolving air cylinders, in connection with the chucks or the collets they serve to operate, are playing a very large part in speeding the war effort, as they do in any place where a great volume of turning is involved. Expanding arbors, too, may be had which are operated by cylinders of this kind. Often, these devices are used as standard by lathe builders.

It is readily apparent that one jaw of a workholding vise may be made of sliding type, and affixed to the end of an air-operated piston. Therefore, the air cylinder is fully adaptable for holding various types of work. Such vises have been placed on the market and are finding a great amount of favor. They are provided with bases which may be bolted readily to the machine tables, just like ordinary machine vises. Since the air hoses may be attached or detached readily, and valves for operation are made integral with the vises themselves, these convenient tools may be transferred from one machine to the other as the need arises.

It is worthy of note, however, with specific reference to the design of air-operated vises, that the required travel of jaw in some vise layouts is quite small. Some excellent air vises have been developed which use diaphragm movements instead of cylinders and pistons. At least one of these provides foot control for operation of the air valve.

Hydraulic cylinders, as well as air cylinders, are made in rotating types so as to be suitable for lathe applications and similar duties. One modern turret lathe is fitted with a rotating hydraulic cylinder, which actuates a three-jaw chuck. A hand operated valve is provided on the machine for cylinder and chuck operation, and a separate hydraulic unit furnishes the fluid power, so that power for operation of the chuck will be uniform at all times.

Just as there are cases where electrical interlocking must be practiced, to prevent starting the feed of some machine



ONE TOOL
did all this!

... Bored and bottomed the large blind hole—then faced the stepped surfaces.

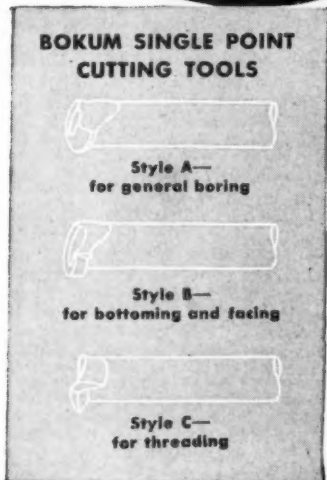
ALL WITH ONE

BOKUM BOTTOMING AND FACING TOOL (STYLE B)

Helical back off insures constant clearance and extremely long life of tool, since sharpening is done by grinding face only. Why use two tools when the job can be done with one?

Ask for Catalog H-1139 for Super High Speed Tools, and for H-398 for Carbide Tipped Tools.

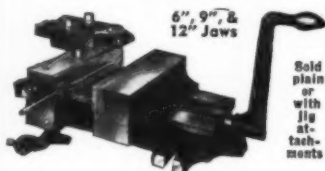
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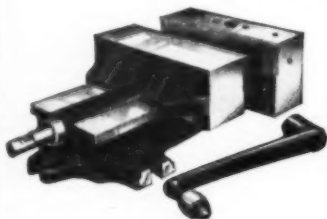
BOKUM TOOL CO.

14775 WILDEMER AVE. • DETROIT 21, MICH.

GRAHAM MULTI-PURPOSE VISE



**For special-holding
jobs on a wide
variety of machines**



An excellent plain vise, this tool also provides a variety of special jaws, guides and stops, enabling it to serve as a ready-made jig or fixture for hundreds of special-holding and repeat-operation jobs. Sizes from 124 lbs. are available, suited to use on drill press, shaper, planer, radial, miller, grinder, etc. Flush, square and parallel construction is of great assistance in rapid set-up.

Request Illustrated Price Circular

GRAHAM MFG. CO.
59 Bridge St. East Greenwich, R. I.

tool before the cutting unit has been started, so there is an occasional case where interlocking is in order with a power cylinder. An instance of this is found in a certain hydraulic die casting machine. Two levers control operation of the machine. These are interlocked in such manner that it is impossible to operate the hydraulic cylinder until the dies have first been securely locked. Thus, possibility of damaging the machine is averted.

Have you ever noticed a hydraulic cylinder fitted with a step-by-step control? Such a control has particular value in application to sensitive drilling machines, where a continuous-feed control might be the cause of many broken drills. Sensitive drilling units as built by one company, and fitted with hydraulic feed if and when desired, may have the feed control applied in either continuous or step-by-step type. The latter insures removal of drill chips from the hole being drilled at regular intervals, and allows coolant to get down to bottom of the hole. It is in cases where long holes of small diameter must be drilled that this is of greatest value, as for instance oil holes being drilled in connecting rods, king bolts, etc.

You have no doubt noticed how widely hydraulic cylinders have been applied to different kinds of material handling equipment. In fact, some builders of such equipment specialize in the application of hydraulic cylinders. As far as hoisting is concerned, at least one firm has long provided hoists of the air cylinder type. One advantage of such hoists is that they can do themselves no damage if and when one attempts to lift a load beyond their capacity. They simply do not function.

Air cylinders may be purchased from some firms, specializing in their manufacture, with any length of stroke desired, and in diameters from one to 12", either single-acting or double-acting, and with or without cushions. Aside from this, any special cylinder desired will be built to order. Therefore it is evident that whatever the job on which you wish to apply an air cylinder, the cylinder will be available, without any worry as to the problems involved in its production.

Naturally, it would be an injustice to



Still
the No. 1
**PRODUCTION
DRILL**

The Buffalo No. 15 Drill was designed for "manufacturing" sturdiness—a necessary ruggedness which shop tools must have to stand-up with long-shift, semi-skilled labor. The No. 15 is simple—so that adjustments are easy. It is accurate enough for all ordinary manufacturing operations:

And it's **STILL** the No. 1 choice of production men for turning out 24 hours work every day!

Several models, in bench and floor types—reasonably good delivery. Write today for bulletin No. 2963-D.



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Canadian Blower & Forge Co., Ltd.,
Kitchener, Ont.



"Buffalo"

**No. 15
PRODUCTION DRILL**



CUB

VARIABLE SPEED TRANSMISSION

For "A" section V-belts—3.3—1 speed range—perfect belt alignment in all positions. Priced so low that no shop or machine need go without infinite speed selection. See your dealer or write **\$16.50**
(3 Types—8 sizes to choose from)

Standard Transmission Equipment Co.
3409 VERDUGO ROAD LOS ANGELES, CALIF.



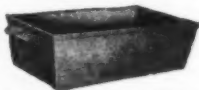
LITTELL Air-Blast Valve automatically ejects pieces from punch presses. Keeps operator's hand out of danger zone. Increases safety and speed. Air nozzle quickly adjustable.

Other Littell safety devices include Pres-Vac Safety Feeders for picking up and feeding flat-surfaced materials; also, air-operated Mechanical Pickers for feeding pieces that vacuum lift will not pick up.

Littell makes a complete line of Automatic Reels, Feeds, Straighteners, **REQUEST BULLETINS** Scrap Cutters, etc.

F. J. LITTELL MACHINE CO.
4153 Ravenswood Ave., Chicago 13, Ill.

New Nesting Type Tote Pans



20" long x 12" wide x 6 1/4" deep.
16 ga., drag holes and handles both ends.
J. L. LUCAS & SON, INC.
BRIDGEPORT, CONN.

close an article of this kind without making at least passing mention of the application of hydraulic cylinders to presses of different kinds. The term "hydraulic press" has been familiar to us before we knew about many of the applications already described. Usually, we think of hydraulic presses as having tremendous power, and there are many sizes and types. However, there are relatively small capacity hydraulic presses of various kinds. And there are arbor presses of hydraulic type. One of these, having a 75-ton capacity, utilizes a handwheel along with the hydraulic cylinder, in order to combine speed with the power of the cylinder. A spin of the handwheel brings the ram speeding up to the work, and from that point on, advance of the more slow and powerful type is applied thru the hydraulic cylinder by means of a convenient hand pump.

Illustrations are from the new Bellows Photo Facts file, a collection of 25 photo reproductions of representative installations in plants all over the country. Copies of the photo file are available from the Bellows Co., 861 E. Tallmadge Ave., Akron, 10, Ohio.

Standard Since 1911



INCLINABLE POWER PRESSES

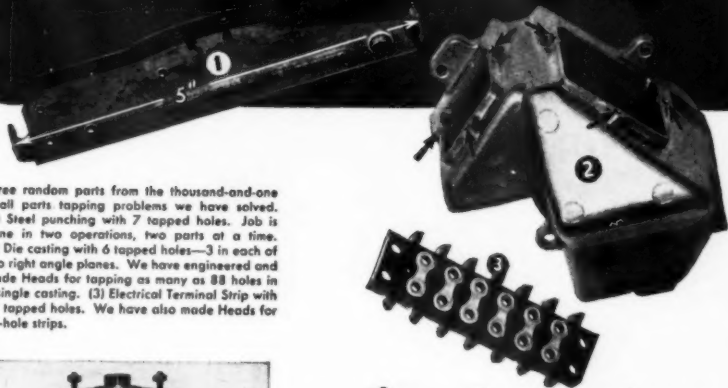
5 to 79 tons
NO. 5 BACK GEARED TYPE

Write for catalog.

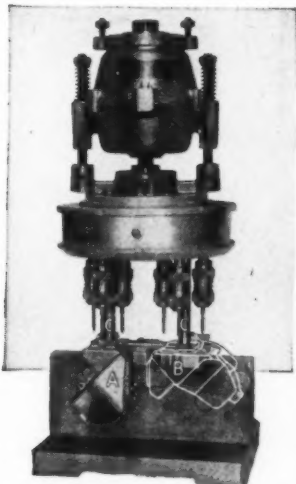
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Successors to Lathrop-Jordan Tool & Machine Co.
1621 STERLING AVE. ELKHART, INDIANA

THE FAST, LOW-COST WAY TO TAP SMALL PARTS - - - like these - - -



Three random parts from the thousand-and-one small parts tapping problems we have solved. (1) Steel punching with 7 tapped holes. Job is done in two operations, two parts at a time. (2) Die casting with 6 tapped holes—3 in each of two right angle planes. We have engineered and made Heads for tapping as many as 88 holes in a single casting. (3) Electrical Terminal Strip with 12 tapped holes. We have also made Heads for 24-hole strips.



This is the complete Head for part 2 above. Parts are progressively fed from position A to B, three holes being tapped at each position, at the same time, in two different planes. Parts are simply laid over horns and are automatically positioned and held in place by locators C, C, when spindles are fed. Simple, fast and fool-proof.

The *Ettco-Emrick* System of MULTIPLE SPINDLE HEADS

Figuring out the way to handle small parts to get **highest tapping production** is a specialized engineering job. The Ettco-Emrick System of Multiple Tapping Heads is the result of many years of specialization in this field.

This system provides a selection of a dozen different standardized methods for obtaining the fastest production on a wide variety of shapes and sizes of parts and number and spacing of holes.

Each Head is specifically engineered for a particular part. Fast loading, automatic clamping and unclamping are built-in features. All parts of the Head are tied together with guide posts similar to a punch and die.

Heads can be used on any drill press. The set-up is simply a matter of clamping the Head onto the press—any shop man can do it.

BEFORE you decide on how you are going to do any small parts tapping, consult Ettco-Emrick. Engineers of many leading manufacturers are doing this regularly. They have learned it saves them time, money and headaches.

ETTCO TOOL CO.

596 Johnson Ave.
DETROIT 1

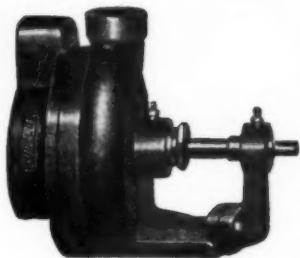
Brooklyn 6, N. Y.
CHICAGO 6

*Over 25 years specialization in solving
Industry's drilling and tapping problems*

FULFLO COOLANT PUMPS

and

BY-PASS VALVES



FULFLO COOLANT PUMPS

bring the coolant to the work in a constant, steady stream

America's amazing production records are little short of miraculous . . . and it's due mostly to the remarkable efficiency of the multitude of machines. And when you consider that a great majority of these miracle-makers need coolants . . . you see why your plant needs America's finest pumps . . . FULFLO.

Install FULFLO COOLANT PUMPS for constant performance. Right or left rotation; direct, belt or motor driven. Master motors, special patented seal. Pipe sizes $\frac{3}{8}$ " to $1\frac{1}{2}$ ".

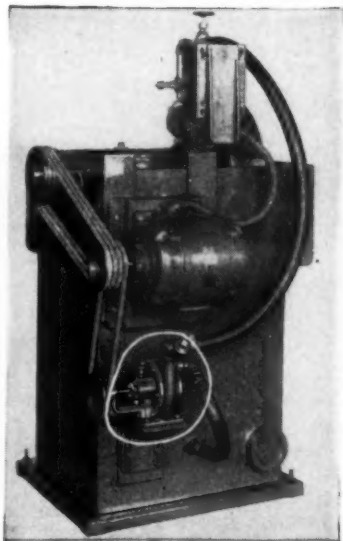
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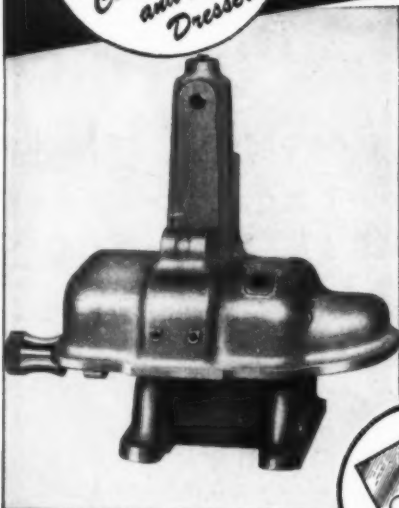
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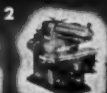
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By Edmund Mottershead

THE EXECUTIVE SIDE OF FOREMANSHIP

IN previous articles, I have already pointed out that in order for the industrial non-coms, the foremen, supervisors, and leadmen, to fit themselves for promotion and advancement thru being better able to perform their tasks, it is essential to start out with information about the man (the foreman) and information about the job. By self analysis, it is possible to determine the personal traits that are characteristic of a good supervisor or foreman, and also how well individuals assay on these traits.

The job itself breaks down into three aspects,—technical, executive, and dynamic. We have examined in some detail the technical side of foremanship and discovered some of the duties and some of the thinking a foreman does from this standpoint. Now we shall consider the executive side of foremanship.

As an executive, the foreman deals with the working force as a production unit, with materials as the substances of production, and with machines and equipment as the tools of production. He is

concerned with the skill and knowledge of his people, and also their health, safety, and conditions under which they work. Materials and supplies must be received, stored, routed, inspected. He is responsible for the tools and mechanical equipment in his department, to the extent that proper tools are provided, that they are used correctly and receive the necessary care and maintenance. Power equipment in his department requires his attention as to care and use. He also has control of operations and processes, plans production in the department, changes operations where necessary, and devises methods for doing the work. He is burdened with a certain amount of necessary paper work, including not only the minimum necessary records of time, materials, and labor but also plans, directions, suggestions, etc. Costs are his constant problem, and they will be increasingly important, especially the indirect or hidden costs. Plant policy is another element in his job.

The executive side of foremanship em-

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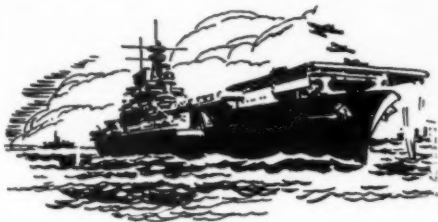
bodies three principal phases:—planning, management, and supervision.

Planning in its broadest sense pertains to the formulation of a program for the entire organization to follow. It begins with the plans of the board of directors, and follows down to the smallest group of workers. It considers the finances of the present and of the future; the functions of selling, engineering, cost accounting; the layout of the plant; departments and equipment; the routing of a pathway for materials to follow in their flow thru the shop; the scheduling of the times jobs are to be started and completed; the following-up or dispatching of work from step to step; the directing of individual production; and the anticipation and meeting of needs for labor and material. There is one great requirement of the individual who is to carry out any part of this planning function . . . vision.

The ability to plan demands vision, the ability to see ahead, to imagine, to anticipate contingencies and to prepare for them. It is not so much the setting up of a rigid program as it is the establishment of definite objectives and of anticipating every possible contingency which may arise on the road towards achieving those objectives. There are perhaps two main qualities which make one man a worker and another man a leader and executive:—the ability to handle other men, and the ability to think and plan. Thus, for the foreman who seeks further advancement, an understanding of production planning is essential. For the foreman who wants to make his department as efficient a part of the plant as possible, an understanding of the particular production planning of his organization is essential. And for the foreman who will advance, the ability to plan productively is essential.

There are six factors with which production planning is basically concerned: (1) The determination of what is to be made; (2) When it shall be made; (3) Where it shall be made; (4) By what methods it shall be made; (5) How much of it shall be made; (6) At what cost it shall be made.

Thus the term "production planning" refers particularly to the actual productive processes of the organization. In the typical small plant, where two or three,



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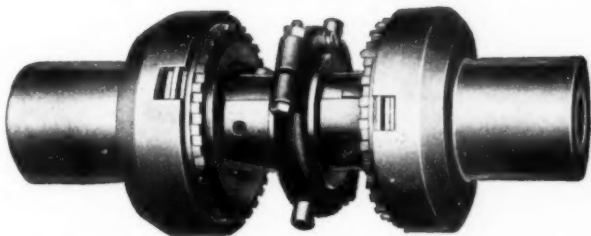
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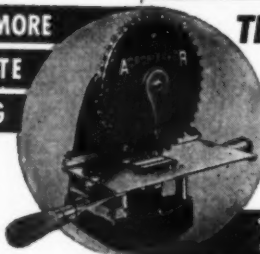
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or possibly only one foreman, actually supervise the work, the head foreman or superintendent and a production clerk may take care of the systematic outlining and control of the flow of work. In larger organizations, this work is carried out by a planning department, a methods engineering department, an engineering department, production control department, or some such . . . the function is the same whatever the name given the department, and that function must be carried out in the small plants with intensified care.

Planning is essentially a matter of analysis. Whether the plant is large or small, no planning worthy of the name can be done for production or any other purpose until the problems incident to it have been analyzed. This applies equally well to the plant with an established planning department as it does to the plant where one person carries out the function.

A good general standard to use as a guiding principle is so to plan that all employees, machines, and equipment as well as materials are profitably employed. This means that there must be careful

study of men and machines, a thorough knowledge of tools and other equipment required, a detailed separation of each job into its component elements thru job analysis and timetudy.

All foremen should understand planning methods in their broad aspects, and especially the details of the particular system used in their own plants. Beyond any question, the best system will fail without the understanding and cooperation of the foreman. Every foreman must appreciate the fundamental fact that he is a part of the management, the part of the management most frequently seen and encountered by the workers. By his understanding the principles and purposes of production planning as manifested in his plant, he is better situated to help in solving the problems of production in his own plant and in his own department.

The step from planning to management is simply that from idea to initiating action. Having laid the plans and provided for as many contingencies as could be foreseen, the two problems of getting out the work speedily and keeping men



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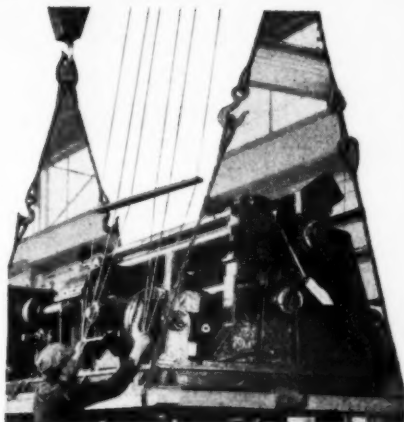
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and machines economically occupied represent the foreman's handling of the four big factors in his work:—men, materials, machines, and methods. As a manager in his department the foreman thus initiates action concerning these four factors.

As a manager, dealing with his working force, the foreman is first concerned to see that the right man has the right job, or that the worker has the required skills. If the right man is not on the right job, he will either find a man with the right skills, or arrange for training the worker. Thus the training, breaking-in of new workers, and the upgrading and development of older workers is a primary responsibility. With this training duty, he has the responsibility of providing a substitute for himself, an understudy as it were, in case the foreman should be absent for any length of time or should leave and have to be replaced. He must evaluate the jobs, and whether he sets the rates himself or not, is responsible for proper rates of pay on the jobs in his department. Conditions within the plant which affect efficiency of the workers are part of his responsibility, and it is his duty to see that sufficiently sanitary, pleasant, and comfortable conditions are provided. His too is the problem of obtaining not only enough men to handle the work in his department, but also to see that manpower on hand is not wasted. Men who are idle part of the day or who are not working at their highest skills represent wasted manpower.

Machines, the second factor of the big four in the foreman's job, present two problems:—to have at hand the right machines for the jobs and operations requir-

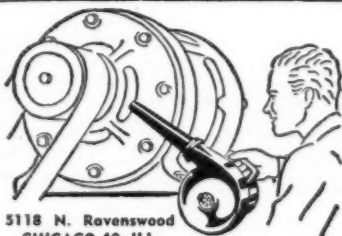
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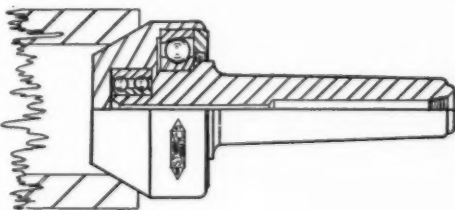


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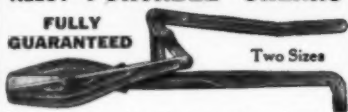
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ed in producing the goods, and to maintain these machines at the highest possible level of operating efficiency. Where the work must be accomplished without the most suitable equipment, he must devise the best methods of using equipment at hand. This responsibility concerning machinery demands not only that workers be trained in use and care of equipment, but that someone also perform an all-around maintenance function. The problem of economical use of machines, so they do not stand idle and so they perform jobs which they can do most efficiently and economically is also his responsibility.

Materials, the third factor in his job, must be received and stored, handled in transit thru the shop, inspected when received, and finished product inspected before it leaves the plant. The foreman's task is not only to have enough of all materials needed on hand at the right time and place to avoid bottlenecks in production, but also to see that the most economical use is made of materials in production. This involves, of course, a certain amount of paper work in requisitioning material, in routing and scheduling it, as well as in supervising other aspects of production.

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tioning material, in routing and scheduling it, as well as in supervising other aspects of production.

Methods, the fourth factor, come within the province of the foreman from several standpoints. Inasmuch as he is charged with the responsibility for getting out the goods in his department, he is vitally interested in methods used so he will be successful in discharging that responsibility. He is in a position, both because of his knowledge of the work performed in the department, and also because of his knowledge of the abilities of his men and machines, to suggest methods of production to the planning department, if any, or to plan, install, and supervise the methods of production in his department where he does all the planning himself.

In summary, as a manager, concerned with men and machines, materials and methods, the foreman should view his job as tho he were in business for himself. If he has only 20 men under him, he has an annual labor budget of at least \$40,000 a year. Probably the investment

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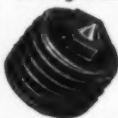
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in plant and equipment for each worker is at least another thousand dollars, say around \$25,000 to make it very small. If the productivity of his workers is about average, the materials used in production will run about \$60,000 a year or probably much more. Were the foreman actually in business for himself, he should ask one question about every expenditure for labor, materials or equipment, and about each method used:—"Will it pay?" If it is a question of choosing between two or three alternatives, "Which will result in the most profit?" As a manager, the foreman will initiate the lines of action which will be at once most productive and most profitable.

I have said that the step from planning to management was the step from ideas to initiating action. However, all good ideas and all good starts demand one thing:— following thru. The largest part of the foreman's job from the standpoint of time and energy consumed is that of supervision, providing the follow thru to see that the plans are made to materialize, and that the actions initiated are carried out as required.

Supervision, as such, represents the combination of the sum total of the foreman's activities thru which he makes sure that the jobs get done, correctly, on time—that tools and equipment are used properly—that safe practices are followed and that waste and scrap are kept to a minimum.

I have talked about the technical side of the foreman's job as involving his own technical knowledge, his job experience, his ability as an instructor, and finally his supervisory work in seeing that jobs are done right. I have talked about the executive side of his job as running from planning to managing to supervising the operations in the plant. Another article will analyze the dynamic or human side of the job.

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The additions include complete data on filters (for machines which employ these devices) and detailed specifications on all lubricants for Cincinnati machines. The new booklet gives general instructions, illustrated with amusing cartoons that stress the important points. There are diagrams of the different models and tabulated instructions giving frequency of lubrication, parts to be oiled and kinds of lubricants to use. The definite specifications and recommendations include full data on the different kinds of oils to use and test requirements of the different lubricants.

This new booklet should prove more ef-

fective than previous editions in helping to reduce maintenance expense thru correct lubrication in shops equipped with a variety of Cincinnati machine tools. Copies may be obtained by addressing Cincinnati Milling and Grinding Machines, Inc., Publications Dept., Cincinnati 9, O.

ENGINEERS' GLASS

Two new products are announced by Engineers Specialties Div., Universal Engraving & Colorplate Co., 588 Monroe St., Buffalo, 11, N. Y. Their 16-page booklet describes the two types of Engineers' Glass, Translucent and Scribing, recently developed. Also covered are the two types previously produced by the firm. Illustrated and described are their new Grid Comparator Charts, and prices of these specialties appear in a separate booklet "Specifications and Prices". Both publications are available from the company upon request.

INFRA-RED BULLETIN

To acquaint interested persons with the many advantages of the Infra-Red Process, makers of Birdseye Infra-Red Lamps have prepared a special brochure on the subject.

The "mystery" in which the Process has been cloaked has been entirely elim-



CLOSED

TRADE



CLOSED

MARK



OPEN

Plain Type

Offset Type

CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

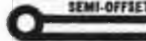
**AUTO MOULDING
& MFG. CO.**

SPECIFICATIONS:
Open Width ½" to 6"
Gage Material .040 to .125
Pin Diameter .101 to ¾"
Lengths to 120"

THREE-FOURTHS OFFSET.

**2326 S. CANAL ST
CHICAGO**

SEMI-OFFSET



3 SIMPLE STEPS MAKE AN ACCURATE ANGULAR SET-UP WITH THE MAGNA SINE



Using the MAGNA SINE Table of Constants supplied with each MAGNA SINE select the gage block that is equal to the sine of the desired angle. The sine bar method is the only truly accurate method of determining angles. This fact plus the extreme accuracy with which the MAGNA SINE is built means set-ups that are true to the highest degree of precision.



Place the gage block between the roller bar and the base plate, tightening the holding screw at the pivot for increased rigidity. The MAGNA SINE is now completely set. Nothing can move, yet there is no pressure to distort the set-up and cause inaccuracies. Setting up a compound angle is no more difficult than setting up a single angle. It simply requires one more gage block and a compound angle MAGNA SINE.



Now place the work on the MAGNA SINE and throw the switch. The work is held securely and is ready to grind. This simple procedure has taken but a few seconds at the most as contrasted with an hour or more often required for making angular set-ups using sine bars, angles and conventional methods. Every grinder doing an average amount of angular grinding work should be equipped with its own MAGNA SINE for better work at lower cost.



Robbins

ENGINEERING COMPANY

318 MIDLAND AVE.

DETROIT 8, MICHIGAN

inated, and the reading matter is in simple, everyday language that can easily be understood and made clear.

The brochure answers all questions that have come up, and explains by photos and example how this new "wonder" can be applied to industry, commerce and in the home.

A copy will be sent to anyone addressing Wabash Appliance Corp., 345 Carroll St., Brooklyn 31, N. Y. dividual application.

"JUNIOR" PRESS BULLETIN

A four-page, two-color folder (Bulletin VJ1-44) describing its expanded line of

improved "Junior" hydraulic presses intended primarily for light and medium duty assembly and broaching work, is now available from Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit 13, Mich. In addition to broaching machines and hydraulic presses, they also produce broaches for a wide variety of operations, broaching machine fixtures, pullers and gages.

The bulletin gives complete specifications, descriptions and photographs of both bench and base types of "Junior" presses, each now available in one, two, and four ton sizes. The base type press provides room within base for a coolant pump and chip receptacle, as well as permitting pull-down broaching for operations where extreme accuracy is required or where broaches are too small to be pushed thru the work.

New appearance, greater rigidity, as well as greater facility of mounting of special fixtures and their alignment with the ram are included in the new features described.

Accessories described include an external pressure control for limiting maximum ram pressure; a pressure gage which can be used as an indicator of dull broaching tools or to check assembly work for fits; and a variable speed control with which ram speed can be adjusted to any desired rate below its maximum of 30' per minute.

HEAT TREATING POTS

A new Bulletin No. 10 covering The Design, Application, Selection and Operating Care of Alloy Pots for Various Heat Treating Media has been issued by Sterling Alloys, Inc., Woburn (Boston) Mass. The bulletin gives 8 pages of interesting and helpful information on liquid heat treating equipment and methods.

Another Bulletin 200 is an Engineering Data Book on Stermet Heat and Corrosion Resisting Castings.

Acome

WIRE MESH PARTITIONS FOR TOOL CRIBS AND STORAGE ROOMS



Window Guards
SEND FOR
CATALOG

Stop sabotage—protect your factory and war production with Acome Wire Mesh Barriers. That's the most effective way of safeguarding tools, parts and critical materials, preventing loss, theft and malicious tampering. Acome Barriers provide

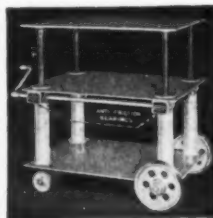
- Minimum interference with ventilation.
- Protection with minimum obstruction.
- Creates no fire hazard.
- Maximum economy in use of critical materials.
- Facility of rearrangement to meet changing conditions.

Acome

WIRE & IRON WORKS

CANFIELD & MORAN STS., DETROIT 7, MICH.

THIS IS OUR FORTY-FIFTH YEAR



TAKE A LOAD OFF YOUR MEN'S BACKS PORTELVATOR

(Portable
Elevating Table)

Lift—push—fetch and carry—use as work bench—or for overhauling work—PORTELVATOR saves miles of steps and many dollars of costs.

Write for details.

THE HAMILTON TOOL CO.

Ninth and Hanover Streets.

HAMILTON

OHIO




28 Pieces per minute

TAPPING PRESSED STEEL SHELLS

6,000
to 15,000

HOLES PER TAP BEFORE GRINDING



TAP TIPS
Number 1
ALWAYS CHOOSE
THE RIGHT TAP
FOR THE JOB.

Here's another outstanding performance record for WINTER Taps.

Pressed-steel shells were tapped with 5/16-inch, 24-thread WINTER Taps, at the rate of 28 pieces per minute — as against 17 per minute with taps formerly used.

Tapping speed; 2300 RMP. Cutting speed; 185 surface feet per minute.

On this job WINTER Taps averaged 6000 to 15,000 holes per tap before grinding was necessary. Compare this with the average of only 3000 holes per tap, of taps formerly used.

Value and service are two main items you get when you specify WINTER Taps. Winter Engineers will gladly recommend the right taps to solve your threading problems.

Winter Brothers

COMPANY  Wrentham, Massachusetts, U.S.A.
BRANCH STORES SAN FRANCISCO CALIFORNIA - CHICAGO ILLINOIS - DETROIT MICHIGAN

Heat Treat

Your Own Small Parts...

SAVE TIME AND MONEY THESE 5 DIFFERENT WAYS

This small compact electric furnace is inexpensive, handy and easy to operate—ideal for small tool and die shops—saves time these five different ways:

- 1 Eliminates delays in sending small machine parts out to overcrowded commercial heat treaters.
- 2 Saves time and expense of drawing or tempering small metal parts in large furnaces.
- 3 Cuts handling time when normalizing or annealing small parts. No waiting.
- 4 Conveniently available for pre-heating for subsequent high-speed hardening.
- 5 Eliminates shut downs and delays in servicing emergency repair orders.

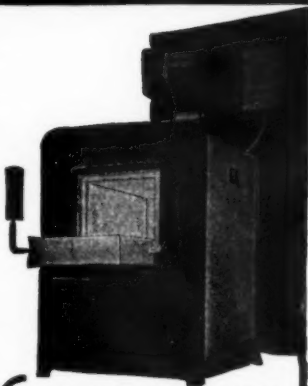
AVAILABLE IN TWO SIZES

Type	Chamber Capacity	Amps 115 V	Watts	Amps 230 V	Price
MH-3	8"W 6"H 14"L	29.6	3400	14.8	\$124.00*
MH-4	10"W 6"H 18"L	...	4800	20.9	\$191.00*

*Includes Hearth Plate

MAX. SAFE TEMPERATURE—Continuous operation, 1750° F.; Intermittent operation, 1850° F.

AUTOMATIC CONTROL—Indicating Controlling Pyrometer—Thermo-couple and lead wire complete—\$152.40.



REPLACEABLE HEATING ELEMENTS—Replaceable nickel chromium resistors embedded in rectangular refractory blocks. Elements form inner walls of furnace chamber, and may be replaced easily and quickly after removing rear panel—furnace structure remains undisturbed.

FREE Complete data covering specifications, additional applications and ordering instructions are included in this new folder. Write for your copy today. Ask for Bulletin No. 50.

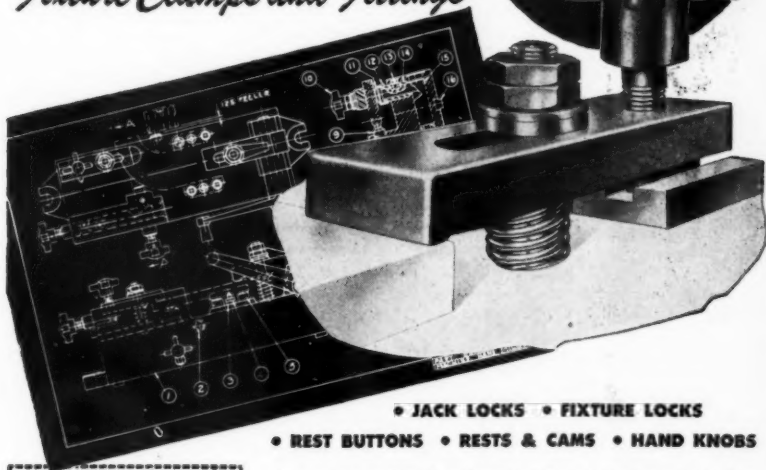


COOLEY ELECTRIC MANUFACTURING CORP.
36 SOUTH SHELBY STREET • INDIANAPOLIS 7, IND.

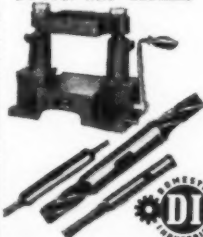
**KNOCK DOWN
SETTING-UP TIME**

SIEWEK
Fixture Clamps and Fittings

**50%
to 75%!**



Also Makers of
SIEWEK
Rapid Clamping Drill Jigs
and
Progressive
SNEAR-CUT End Mills



As a result of skilled engineering, Siewek Clamps save 50% to 75% of the time ordinarily required to meet the job conditions. These clamps also require a minimum of details to fit them to the job. Moreover, you can buy the complete clamp assembly for less than the cost of designing it on your drawing board.

Made in 24 different types, most of them in three sizes, there are Siewek Clamp Assemblies to meet the needs of most jobs in practically any shop. They are strongly constructed to provide uniform right angle pressure for secure holding. Clamp bars are specially heat treated and hardened to give maximum service. Siewek Clamps are made to last for years, with a liberal factor of safety.

Write today for full size template drawings to use in laying out work.

SIEWEK TOOL DIVISION

OF DOMESTIC INDUSTRIES, INC.

DETROIT (FERNDALE STATION) MICHIGAN • Distributors in Principal Cities

CIRCLE "R" METAL CUTTING SAWS

NO WONDER THEY'RE GOOD

This company has been making circular metal cutting saws since 1923, when it was founded, and all its officers and employees were experienced saw makers for a long time before that. Almost all of our factory space, 20,000 square feet, is devoted to this one product.

So it is a fair assumption that we "know" circular saws. In fact we *have* to, because our reputation depends chiefly on this one product. No wonder circle "R" saws are good!

Have you tried them? If not, send for our Catalog K.



PRECISION CONTROL

of manufacturing is another reason why Circle "R" saws are good. Our modern heat treating ovens have potentiometric control, — the most accurate method for the purpose.



CIRCULAR TOOL CO., Inc.



PROVIDENCE 5th R. I.

CHICAGO • PHILADELPHIA • NEW YORK • DAYTON • CLEVELAND
LOS ANGELES • ROCHESTER • INDIANAPOLIS • DETROIT • ST. LOUIS

How ESCO DRILL JIGS SPEED UP DRILLING!



By reducing loading and unloading time to a few seconds, Escó Drill Jigs make possible an almost unbelievable increase in the production rate in drilling, reaming and boring operations. Because of

the man-hours they save, they pay for themselves in a remarkably short time.

Made in a wide range of models and sizes, they take the place of special jigs and fixtures, saving time in getting into production, and saving costly hours of tool-room work.

Immediate Delivery

ESCO ENGINEERING CORP.

5987 Woodward

Write for
LITERATURE

Detroit 2, Mich.

**Drilling Little Holes
to Make Big Ones**
(IN JAPANESE SHIPS)



Photograph—Courtesy of The Bullard Co.

Millers Falls Electric Drills were chosen for the task of drilling hundreds of rivet holes in sections of aircraft torpedoes, in the revolutionary, new, vertical, mass-production method of torpedo assembly recently announced by The Bullard Company, Bridgeport.

Envelope jigs control the drilling of as many as 551 holes at a setting.

Electric drills to carry this tremendous continuous-production load had to be sturdy, precise and powerful. Millers Falls No. 414 drills meet every requirement.

There are equally fine, sturdy, precise Millers Falls production tools for every purpose. Consult the Millers Falls Electric Tool Distributor nearest you. His name will be sent on request.



**No. 414
DRILL**

MILLERS FALLS COMPANY
GREENFIELD, MASSACHUSETTS



Let's Talk Shop

STANDARD MARKING SYSTEM FOR GRINDING WHEELS

A NEW system of "Standard Markings for Identifying Grinding Wheels and Other Bonded Abrasives" is announced by Grinding Wheel Mfrs. Ass'n. December 1, 1944 has been selected as the date to start shipment of grinding wheels bearing these new markings.

Numerous unsuccessful attempts have been made in the past to devise such systems. Perhaps one of the reasons for previous failures has been the fact that wheels made by different manufacturers and similarly marked would not grind alike.

The new standards presented here were prepared with this objective in mind and comprise a standard of markings only and not symbols of grinding action.

The most important revision was adoption of an alphabetical marking system, for all bonded types, to designate grades of hardness. Better provision has been made for the wheel maker to incorporate into the marking such special symbols as might be required to properly qualify the basic symbols of the standard markings.

The new standards apply to grinding wheels and other bonded abrasives; segments, bricks, sticks, hones, rubs and other shapes, which are tools used to remove material, alter shape or size, produce a desired surface or accuracy of dimension, or a combination of these objectives.

The standard does not apply to diamond

STANDARD MARKING SYSTEM CHART

Sequence	Profile	1 Abrasive Type	2 Grain Size	3 Grade	4 Structure	5 Bond Type	6 Manufacturer's Record
	51	- A -	36	- L -	5	- V -	23
MANUFACTURER'S SYMBOL INDICATING EXACT KIND OF ABRASIVE. (USE OPTIONAL)		ALUMINUM OXIDE—A SILICON CARBIDE—G		Diamond		Hard	
		Coarse	Medium	Fine	Very Fine	From 1 to 9	
		10	30	70	220	1	9
		12	36	80	240	2	10
		14	46	90	280	3	11
		16	54	100	320	4	12
		20	60	120	400	5	15
		24		150	500	6	14
				180	600	7	15
						8	Etc.
						(USE OPTIONAL)	
						From 1 to 9	
						1	9
						2	10
						3	11
						4	12
						5	15
						6	14
						7	15
						8	Etc.
						(USE OPTIONAL)	
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GAUGES REWORKED

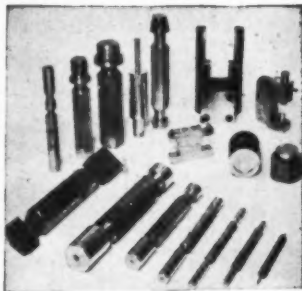
Worn Gauges Salvaged

**Obsolete and Redesigned
Gauges Reworked**

**Plain Plugs, Rings, Flush Pins,
Built Up Snaps**

OWN HARD CHROME PLATING PLANT

QUICK DELIVERIES



New Gauges

Plain Plug, Ring — Taper — Progressive, Wire type — Flush Pins — Flat, Solid and Built up Snaps.

Adjustable Limit Snap Gauges.

Thread, Plug and Ring Gauges.

Special Gauges. Small Fixtures.

MIDDLESEX

GAUGE AND TOOL CORPORATION

526 W. 48th St., New York 19, N. Y.

Quotations and Literature on Request

wheels or to specialties such as sharpening stones, on which radically different symbols are commonly used. Wheels bearing the same standard markings, if made by different wheel manufacturers, may not and probably will not produce the same grinding action.

Each marking consists of six parts, placed in this sequence:—(1) Abrasive type; (2) Grain size; (3) Grade; (4) Structure; (5) Bond Type; (6) Manufacturer's record.

Abrasives naturally fall into two distinct groups, namely the Aluminum Oxide group and the Silicon Carbide group. "A" designates the former and "C" the latter. Where it is necessary to designate some particular type of these broad classes, a manufacturer may use his own symbol or brand designation as a prefix.

The grain size is indicated by a number (ranging coarse to fine, from 10 to 220). Additional sizes occasionally may range from 240 to 600.

Grade is indicated by a letter of the alphabet, A to Z (soft to hard) in all bonds or processes.

The use of a structure symbol is optional. Numbers from 1 to 15 will cover the range of structures being used today. Progressively higher numbers may be used if needed to indicate wider grain spacing.

The bond or process is designated by letters:—V-Vitrified; S-Silicate; E-Shellac or elastic; R-Rubber; B-Resinoid (Synthetic resins); O-Oxychloride. Manufacturer's records are designated by symbols. Each grinding wheel manufacturer is at liberty to use the sixth position for private factory records.

Where the standard method of marking differs materially from the old form, it may be advisable to use both the old and the new markings during the introductory period, enabling users to become accustomed to the conversion gradually.

Where wheels are too small to permit use of the complete marking, the grain and grade marking may be used on the wheel, or the marking on the wheel itself may be omitted entirely. Where this is done the complete marking is to be indicated on tags or labels accompanying each container.

66" PISTON RING

Memories of the past were stirred when The Cooper-Bessemer Corp., recently received an order at its Mount Vernon, Ohio, plant for a piston ring of 66" diameter for one of its steam engines built 33 years ago.

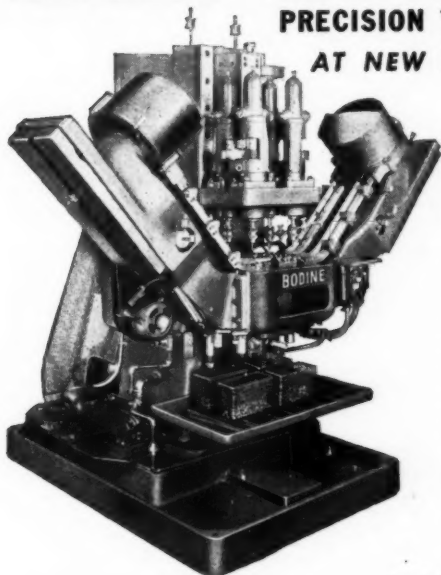
Dipping into archives, the company, which long since turned to making Diesel

Bodine NUT TAPPING with

PRECISION THREADS (Class 3-4-5)

AT NEW HIGH

Speed



ADDED ADVANTAGES

1. Two sizes of nuts can be fed at one time . . . each hopper feeding 2 blanks of a size.
2. If production of Commercial threads is desired (Classes 1 and 2), lead screw control is *not* required. Bodine will convert spindles to spring-compensated type.
3. Even though the machine is streamlined for good appearance and to prevent damaging dust collection, the design is not at the expense of easy maintenance. All important parts and controls are easily accessible.
4. A conveniently located vari-speed unit permits instant speed changes by the turn of a handle.

NEW BULLETIN NOW AVAILABLE

We have just produced an 8-page bulletin which pictures and describes the complete story of the Bodine No. 48 machine. Included are detailed drawings, engineering data and specification tables. You will want to investigate this valuable machine. Send for your copy today.

The Bodine No. 48 Nut Tapping machine has been designed to accomplish two things . . .

1. to produce precision threaded nuts faster . . .
2. to employ unskilled operators.

The precision threading is assured by the use of 4 lead screw controlled spindles which produce 4 nuts simultaneously, at each stroke of the machine . . . the blanks being fed from two double-chute oscillating hoppers.

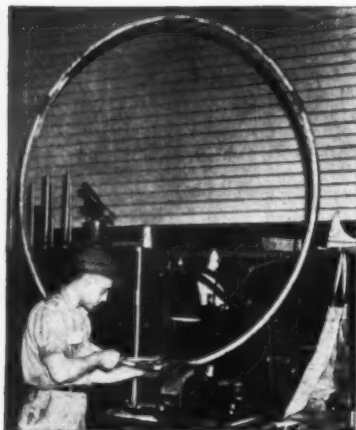
SPEED. Production speed is naturally dependent on many factors such as tap size, threads per inch, nut thickness, material and cutting speed allowable, coolant used, etc. Bodine recommends a maximum operating speed of 45 strokes per minute . . . which totals 9000 nuts per 50 minute hour. This is fast production and includes any nut blanks that can be hopper fed up to $\frac{1}{2}$ " - 13 T.P.I. in mild steel or its equivalent.

INSPECTION. Because the tapped nut from each spindle is collected in its individual basket, it is a simple matter to gauge the product of each tap at any stage of operations.

SAFETY. Electrical interlocks prevent the starting of any motor in wrong sequence . . . nor can taps operate until the nut blank is in proper position on its working plate. Such automatic protection saves rejects, and prevents harm to taps, the machine and the operator.

LEAD SCREW PRECISION CONTROL. All four spindles with their individual lead screws are operated as one by a single segmental gear drive which starts the tap slowly, then reverses at double the tapping speed. The threads on the master screw and its spring-tensioned nut match those of the tap. These control screws and nuts are changed to match changes in tap pitch.





engines, gas engines and compressors, found that the large ring was for a 36 and 66 by 60" cross-compound Corliss engine designed to run at 75 rpm under 150 lbs.

of steam pressure and develop 2450 hp. The shaft diameter is 22" in the bearings and 25" diameter in the center on which is placed the 22' diameter flywheel. Finished weight of the engine is 70 tons.

Reports to Cooper-Bessemer from the owner of this 1911-model engine are that it still is doing a good job.

TIPPING CARBIDE TOOLS

Carbide and high speed steel tipped tools are generally tipped by preplacing a strip of brazing alloy, together with a sufficient amount of flux, between tip and shank. The assembly is then placed in a furnace, or heated in an induction coil. This procedure, however, is sometimes objectionable, as the foil may become tarnished or oxidized and then require a temperature considerably above its own melting point to flow freely. Experiments show that use of alloys in powder form present definite advantages over use of silver brazing alloys in the form of oil.

Two effective silver-copper alloys and one copper alloy are now available in a fine powder. These alloys are economical in use since the required flux is mixed right in with the powdered alloy. This eliminates waste of flux during prepara-

The CRITERION Carbide Tool Grinder

**GREATER
PRODUCTION
CAPACITY**

Provides positive rapid adjustment to meet the rigid requirements of production tool manufacturing. Built for continuous service. Adjustable coolant system. Large work tables instantly adjustable without wrenches or other tools. One-third H.P. balanced precision bearing motor completely enclosed and radially mounted in rubber. Standard equipment. One 50 and one 100 grit 7" dia. steel backed silicon carbide wheels. Ideal for metal bonded or Resinoid bonded diamond wheels.

Order from your dealer or write direct. Request literature. No obligation.



CRITERION
MACHINE WORKS
BEVERLY HILLS, CALIFORNIA



RECONDITION YOUR SAWS AT VERY LOW COSTS

Howe - Lindsey Automatic Saw Sharpener, the fastest and most compact machine for sharpening hack saws, band saws, or metal slitting saws. Automatic in action, requiring unskilled labor; will produce nearly perfect cutting tooth, provides for greater production and longer life of blades, saving steel.

HOWE AND SON, INC. HINSDALE N. H.

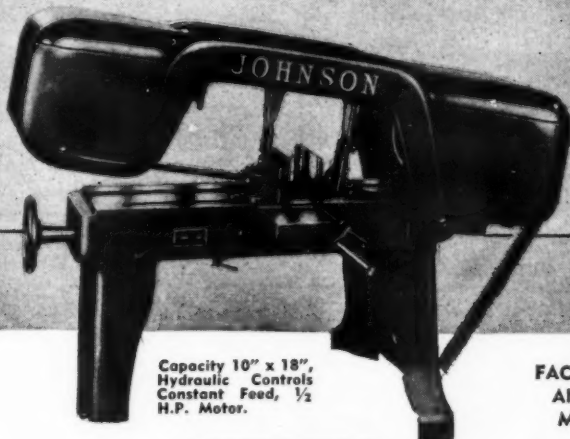
SPEED PLUS EFFICIENCY

Triple Saving Saw

▶ SAVES TIME

▶ SAVES LABOR

▶ SAVES MATERIAL



Capacity 10" x 18",
Hydraulic Controls
Constant Feed, 1/2
H.P. Motor.

FACTORY:
Albion,
Mich.

JOHNSON METAL CUT-OFF BANDSAW

This versatile saw in your plant will help speed production at a real saving in labor, time and material. Suited for every kind of cutting

job, it is simple to operate; offers a wide range in cutting speeds. Three-point base affords secure anchorage on any type of flooring.

J *Write for Descriptive Folder to Sales Offices:*
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The Peerless Vertical comes equipped with either belt or motor drive. It has an adjustable work table which may be tilted 45° for edging or beveling and is designed for quick removal of sanding belt.



Self aligning ball bearings, dynamically balanced drums and substantial construction in a rigid, vibrationless working surface.

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Leveling Made Easy!

4 sizes: 2 3/4", 3 3/4",
5 1/2" and 7 1/2" closed
heights. Self-leveling
ball and socket cap.

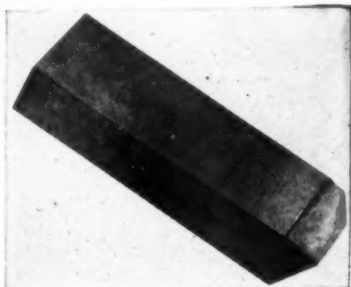


Simplex Machinists' Jacks cut costs by speeding leveling of work on planers, milling machines and other tools. Side lock nut holds screw at desired height. No. 3A, 3" high, is extended further by inserting 1" pipe in base or 1/2" pipe in cap. Ask your dealer.

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Better, Safer Jacks Since 1899

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LEVER - SCREW - HYDRAULIC
Jacks

tion. Then, too, the powder does not require the special handling necessary for cutting foil into small pieces for exact preplacing.



These alloys are a product of the Eutectic Welding Alloys Co., 40 Worth St., New York (13) N. Y. They are known as: EutecRod 1800 (lowest melting) for H.S.S. 940°-1140°F; EutecRod 1601 (high tensile) for Tungsten Carbide 1020°-1250°F, and EutecRod 16 (heat resistant high tensile) for Tungsten Carbide 1300°-1750°F. (furnace temp.)

After the customary degreasing and grinding, the powdered alloy is spread on the surfaces to be joined, and the tungsten carbide tip placed on top. Assembly is then heated until the alloy melts. The metal flows freely at a very slight increase in temperature above the melting point since the weld metal is pulverized. Oxidation of tungsten carbide is prevented, as each particle of molten alloy immediately "tins" and adheres to the surfaces being joined.

INDEXING FIXTURE REPLACES INDEXING HEAD

By C. S. Willmot, Westinghouse Electric & Mfg. Co., Baltimore, Md.

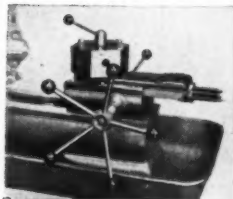
The milling machine setup shown, using a standard indexing head is one that would customarily be used for jobs such as this.

In cases where only ordinary tolerances are specified and quantity permits, it has been found that an indexing fixture, such as shown in the other illustration greatly increases production.

The part is held in the fixture by a ring or mounting plate on a turntable, which, in turn, is mounted on a base plate that is clamped to the milling machine table. The edge of the bottom plate of the turntable has a notch for each machining position; a pawl, attached to the fixture

These Globe products do precision work

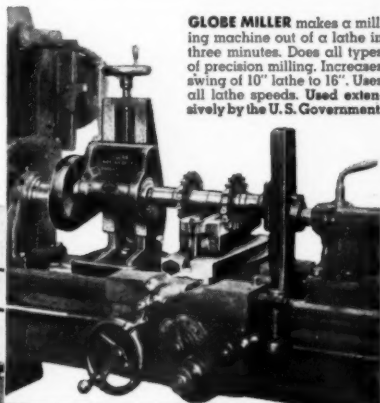
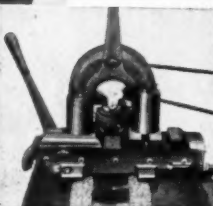
Compact, Rugged Construction, Low in Cost! Immediate Delivery



GLOBE HEAVY DUTY BED TURRETS.

Adaptable to any lathe. 4 3/4" travel. Precision built. Rugged construction.

GLOBE CROSS SLIDE. Adaptable to any lathe. 3 1/2" travel. Rugged construction.



GLOBE MILLER makes a milling machine out of a lathe in three minutes. Does all types of precision milling. Increases swing of 10" lathe to 16". Uses all lathe speeds. Used extensively by the U. S. Government.

IMPORTANT: When ordering or requesting prices on above items, be sure to give: 1. Make and model of lathe. 2. Lathe swing. 3. Power or hand cross feed. 4. State if lathe is equipped with telescoping taper attachment.



GLOBE HAND SCREW MACHINE produces precision parts at high speeds, low cost. Ball Bearing Headstock. 10" swing, 1" capacity, 12 speeds up to 3126 RPM. Exceptionally rugged construction.



MILLING VISE (below) with replaceable jaw plates. Jaws 3 1/4" wide, 3" opening, 1 1/8" deep. Larger sizes available.

DIVIDING HEADS. Precision built. Various sizes available.



Milling arbors. 4", 8", and 12".



WORK HOLDING FIXTURES, hold work of various shapes for milling, drilling, shaping or grinding.

End Mill Holders. Various sizes.



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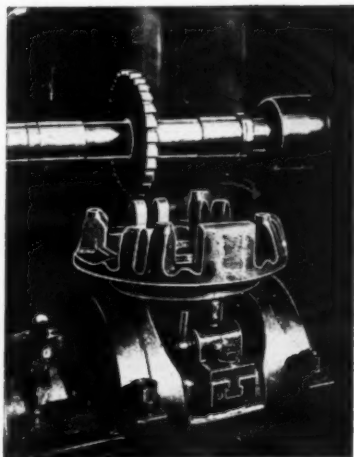
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FOR IMMEDIATE
CUTTING THESE GEAR
GEARS, WE CAN
MAKE IMMEDIATE
DELIVERY ON
BLANKS SAVED TO
SPECIFIED
DIAMETER AND FINE

Greaves MACHINE TOOL CO.

2013-9 Eastern Ave.
Cincinnati, Ohio



base, engages the notches to hold the part in the machining positions. After the operator mounts the part in the fixture, he releases the pawl and manually turns the table till the pawl engages the first notch to locate the part in machining position. When the first machining operation is completed he repeats the process until the whole part has been machined and then removes it from the fixture.



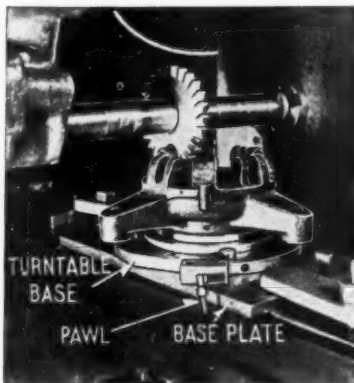
DANLY PRECISION DOWEL PINS

STANDARD AND
OVERSIZE

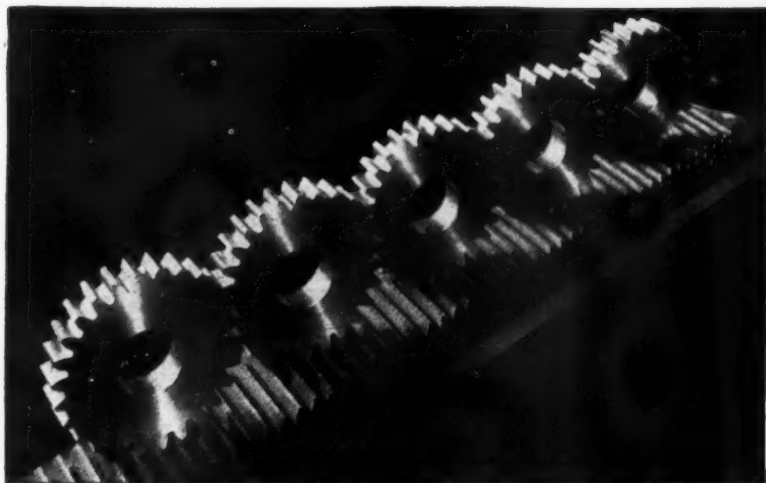
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in .001 oversize for repair
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Ducommun Metals & Supply
48905 Alameda, Los Angeles



To help defray cost of the fixture, a single base and turntable may be pro-

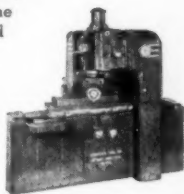


Made Scrap Gears **BETTER** Than OK'd Gears

A gear producer had accumulated a nice stock of scrap spur gears which had sufficient involute errors so that they would not pass inspection, although the gears were in the permissible range of tolerances for eccentricity and size. They couldn't be recut to pass inspection by their present method of cutting due to the fact that they were already to the correct size. When the pile had reached 5000 gears and before scrapping the gears, the manufacturer consulted Gear Production Headquarters. Michigan Tool Company recommended shaving the scrap gears on a rack-type shaving machine.

This was done, and saved the entire lot, by correcting the tooth form well within inspection tolerances without reducing the size on pitch diameter any more than 0.0005 inch. As a matter of fact the formerly scrap gears were now better gears than those which had passed inspection previously.

As a result, all similar gears made by that producer were thereafter finished on Michigan gear-shaving equipment. The saving in scrap alone has probably more than paid for all the machines and tooling employed, aside from the fact that **ALL** gears were now better gears.



For the reasons "why", write for a copy of "Gear Finishing". Ask for Bulletin No. GF-43.

MICHIGAN TOOL COMPANY

7171 E. McNichols Road . . Detroit 12, U. S. A.



vided for a group of similar jobs with individual mounting plates or rings for each job.

In shops where somewhat larger work

is more common, a lighter and less cumbersome indexing fixture will often serve very satisfactorily in place of an oversize indexing head that may not be available.

DRILL JIG FOR ANGLE IRON

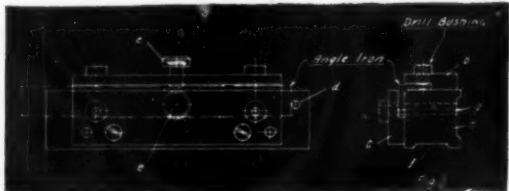
To drill small quantities of angle iron, an inexpensive drill jig shown in the sketch was designed to do the job.

The block (A) serves as jig body and is made from machine steel.

Two bushing plates (B) and (C) are fitted to the body with cap screws and dowels.

A gaging pin (D) locates the angle iron at one end of the jig, while the thumb screws (E) hold the angle during the drilling operation.

To load material into the jig, the angle is slipped in from the end opposite gaging pin and moved up until it is located against the pin. It is then held



in this position by the thumb screws for the operation. The reliefs at (F) were milled to assure good alignment and the holes (G) were drilled to allow chips from the work to escape.

The most expensive part of this jig are the drill bushings. The tool was made in a few hours and proved to be very accurate in operation.

By ALEX S. ARNOTT

**MADE OF ALLOY STEEL
MILLED FROM BAR**

**SOCKET HEAD
CAP SCREWS**



**SAFETY HOLLOW
SET SCREWS**

Try Them On Your Next Job!

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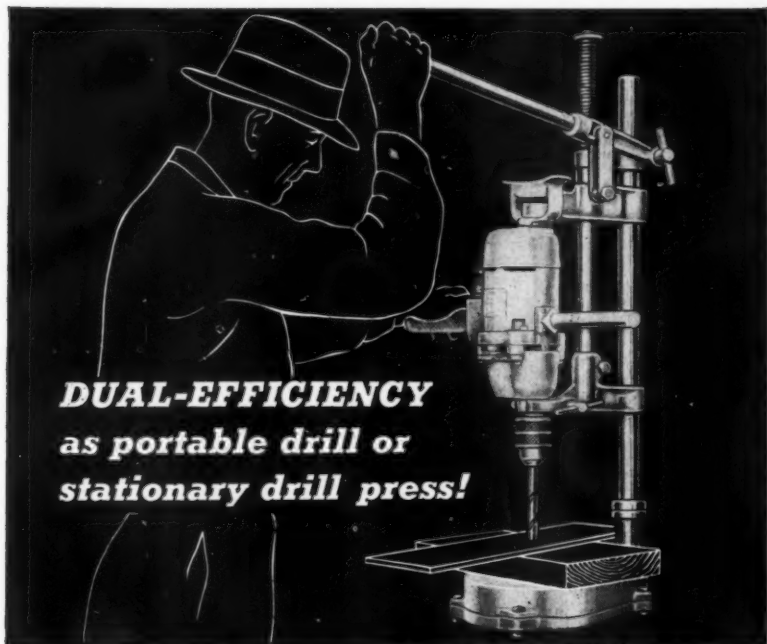
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Elliott Unit Drives can be attached to any motor in your plant easily and quickly, and will give you efficient service at low cost. Unit Drives can be applied in hundreds of finishing operations or wherever constant power in a portable tool is needed. Many types of attachments can be used.

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WITH a CP Drill Stand, you can immediately convert any CP Universal or Hicycle Electric Drill into a convenient and equally reliable drill press. Conversion is easy and rapid. No tools, adaptors or brackets are needed for installation in stand, and removal of the drill is only a matter of seconds. Rigid construction of these CP stands

prevents any possibility of side play.

CP Drill Stands are available for all CP Hicycle Electric and Universal Pistol Grip and Side Handle Drills. They are also furnished with brackets for post or wall mounting. For complete information on CP Universal Electric Tools and CP Drill Stands, write today for a copy of Catalog 899.

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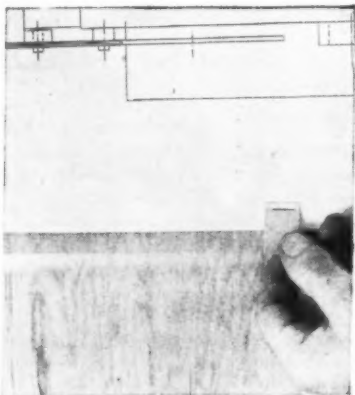
In Canada: Railway & Power Eng. Corp., Ltd.

SWINGING ARM FIXTURE



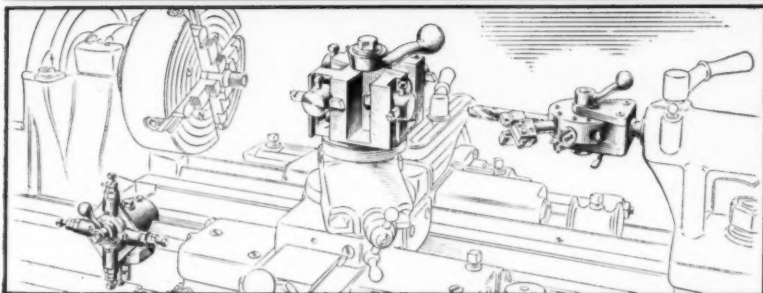
Simplifying the cutting of complicated designs from sheet metal stock, of a maximum thickness of $7/64"$, with a portable power hand shear, E. A. Forss, a tinsmith at the Fitchburg plant of the General Electric Co., designed and built a swinging arm holding fixture which supports the shear. This makes it much easier to operate the shear and gives better control of the work, when cutting complicated designs.

STAPLE TABS



Wire staples have almost universally replaced thumb tacks for holding drawings to the drawing board. The one dis-

How to do turret lathe machining — **ON YOUR ENGINE LATHE!**



THESE 3 SPECIALTIES LATHE ACCESSORIES MAKE IT POSSIBLE!

Specialties Cross-Slide Turret — No. 30 for 9" to 12" lathes; No. 60 for 13" to 20" lathes. Gives you four working positions without tool changes . . . allows multiple machining operations on one lathe. Easy to operate—merely flip the turret from one position to another.

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Taper Shank. Quickly converts engine lathe into 4-way turret lathe for end work. You can perform four different operations with the four positions.

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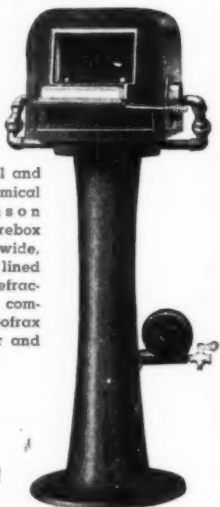
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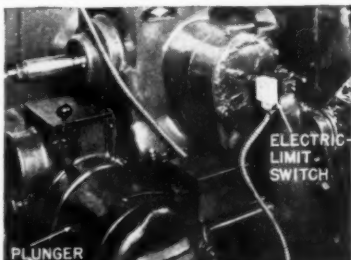


advantage has been that the drawing or tracing is often torn when the staple remover is used. This difficulty is overcome if cardboard tabs are placed under each staple. The staples are then easily removed merely by pulling on the tabs.

By RONALD EYRICH

REDUCING CUTTER BREAKAGE

An electric-limit switch, used in conjunction with a shear pin, has reduced cutter breakage materially on a special plunge milling operation at General Electric's Erie Works. A regular shear key was first tried in the machine but, since the automatic cycle might not be completed, the feed would not stop with the cutter.



An electric-limit switch and plunger were installed and the steel key was replaced with a softer brass one, the length and strength of which was determined by experimentation, so that the key would fail before the cutter. When the key shears, the projecting end—which rides against a disk connected to the limit switch—falls free, releasing the switch and causing the machine to react as tho the cycle were completed.

INDUSTRIAL VACUUM EQUIPMENT

Invincible Vacuum Cleaner Mfg. Co., Dover, Ohio offers a new folder describ-

They Will Fit Into YOUR RETOOLING PROGRAM with *Precision*

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ing the widespread application of their equipment in industry. Copies are available upon request from the manufacturer

as well as detailed information regarding the application of their equipment to special operations.

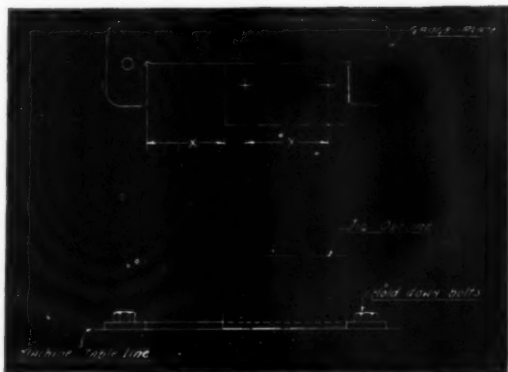
DRILL JIG GAUGE PLATE

To speed up production and assist operators by making their work easier and more efficient, a special jig plate, shown in the accompanying sketch, is being used with good results.

This tool is applied to the handling of jigs on drilling operations where there are two holes to be drilled from one jig. As a rule, operator moves the jig from one position to another in order that the drill will find its way into the drill jig bushings to drill the work, but this gauge gives the operator a definite location for the jig, thus eliminating wasted time.

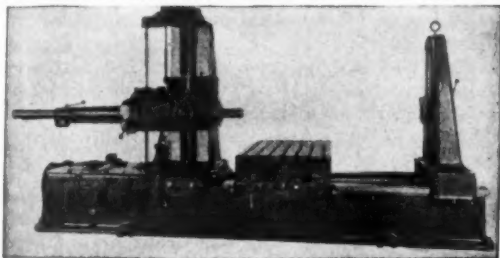
The plate may be made from 3/16" cold rolled steel with all corners rounded. A hole on each end for a machine

bolt is provided to fasten it down on the machine table. The gap to retain the drill jig is made the overall length of the



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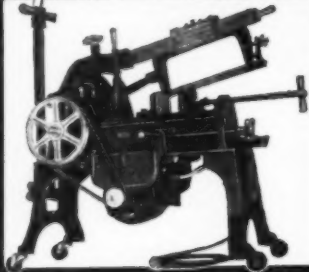
Because "eight balls" loom large in front of every production man at times . . . SYNCRO has developed a specialized service to remove such obstacles. SYNCRO specializes in tough engineering-production problems and in the manufacture of precision machined tool products for Victory and after Victory. Consult SYNCRO now—without obligation.

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 ★ FITTINGS ★**



Most of your machining such as Drilling and Tapping operations are more easily done and at less tooling costs.

WITH JOHN'S DRILL JIGS

HEUSER MFG. COMPANY
 1638 N. PAULINA ST., CHICAGO, ILL.

jig plus the distance between the bushing centers or, as shown in the sketch, when the jig is in the plate the dimension "X" should equal the distance between the jig bushing centers.

By ALEX S. ARNOTT

CARBIDE DRAWING DIES

Extra-performance dies specifically designed for drawing fine steel wire of approximately .015" diameter and under (designated as R-1 dies in the Carboloy catalog) and made from Grade 999 cemented carbide are now being carried as stock items at Carboloy Co., Inc., 11139 East 8-Mile Rd., Detroit (32) Mich. This particular grade of carbide is the hardest metal produced by Carboloy.

As a result of the extreme hardness possessed by Grade 999, there are certain difficulties attendant to its fabrication into dies, that make necessary a slight premium over prices for similar standard dies of other grades of metal. It is said, however, that their extra hardness enables Grade 999 dies to produce wire of greater uniformity and high surface finish over a longer run, thus more than compensating for the added cost. Field reports indicate that the hardness of dies made from 999 permits their use in certain operations possible heretofore only with diamond dies.

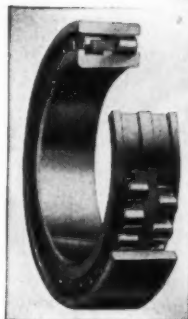
According to Carboloy, the same finishing and servicing technique now used for standard carbide dies may be followed with Grade 999 dies, despite the increased hardness of the metal over that of ordinary carbide.

STAINLESS ELECTRODES

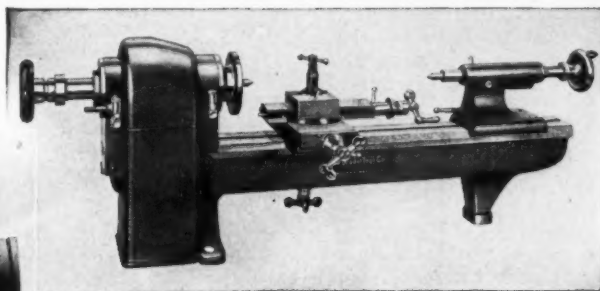
A new informative book on Page-Allegheeny Stainless Steel Welding Electrodes was recently issued. In addition to suggestions on how to select the proper electrode for welding stainless steels, it includes much helpful information on welding procedures and recommendations. The first section is devoted to a discussion of conditions encountered in welding stainless steels. It covers such subjects as carbide precipitation, distortion or warping, effect of heat on the base metal, butt joint design, preparation of joints, and welding dissimilar metals, as well as a chart showing recommended electrodes for different types of stainless steel.

The second section gives detailed information on the several types of electrodes including application recommendations, physical properties and chemical composition of the weld metal, current range and sizes and packing.

Copies may be obtained from Page Steel & Wire Division, American Chain & Cable Co., Inc., Monessen, Pa.



Precision double-row roller bearings are standard equipment on Wade Bench Lathes.



You Cut Unit Production Costs With the Wade Standard Lathe

You cut unit production costs . . . save time and money . . . when you use Wade Standard Precision Lathes . . . because they are designed and built with features that permit faster, lower-cost operation. Wade Lathes enable you to do more work in less time.

Greater savings are made with Wade Standard Lathes because of their scientific design. The spindle stays rigid, for it runs in high precision anti-friction bearings. A staggered double-row cylindrical roller bearing supports the spindle as close to the spindle nose as possible and takes the radial load. A precision ball thrust bearing, just back of the roller bearing, takes the thrust load. The rear end of the spindle is supported in a deep groove ball bearing. All bearings are under a slight preload so the spindle is absolutely rigid. You can take heavier cuts and get better finishes . . . without chattering.

These Wade Standard Lathes are efficient and dependable for time-saving, money-saving production. They are available in three sizes, all with a 7" swing. Maximum collet capacities are $\frac{1}{2}$ ", $\frac{3}{4}$ " and 1" and distance between centers is from $15\frac{1}{2}$ " to 17". To do better precision work . . . to cut unit production costs and save time and money . . . investigate these Wade Lathes now.

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**Bench Lathes and Profilers
For Precision, Versatility
And Stamina**

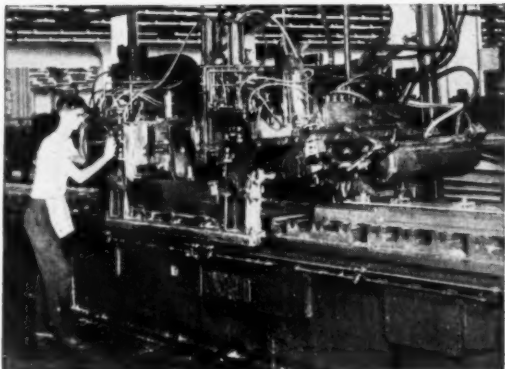
THE WADE TOOL COMPANY

WALTHAM 54, MASSACHUSETTS

THY-MO-TROL DRIVE HELPS CUT MACHINING TIME

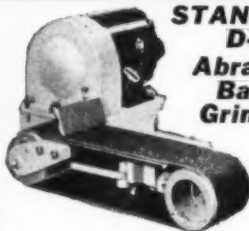
Finishing time in machining aluminum spar beams for plane wings has been reduced from 13½ hours to five minutes at a Cleveland aircraft plant with the help of General Electric Thy-mo-trol, an electronic control widely used in war production. The Thy-mo-trol unit is installed on a large automatic contour milling machine designed and built by Onsrud Machine Works, Inc., Chicago.

The spar beams are long, one-piece structural channels which run lengthwise thru the wings, from fuselage to wing tip. Wing ribs and cap strips are fastened on the beams to make up the rigid wing framework. The spar must be machined accurately to permit perfect joining of ribs and cap strips, and it must also be contoured exactly to



conform with the irregular shape of the wing itself.

Carriage of the milling machine houses four cutter motor assemblies, providing two horizontal and two vertical cutters



**STANDARD
D-4
Abrasive
Band
Grinder**

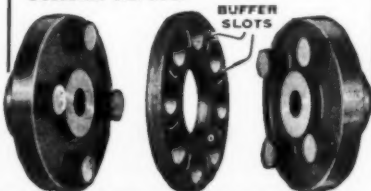
This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4x36¼" band. The ideal portable unit.

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WALLS SALES CORP.
96 Warren St., New York, N. Y.

USE CUSHION TORQUE —IT INCREASES OUTPUT

The BUFFER-SLOT COUPLING lengthens the life of your Motor-Driven Machines by reducing wear and absorbing the load-shock and vibration that are the sources of most machine failures. It gives you all the advantages of the ordinary coupling and in addition restores to your Direct Drives that protective resiliency you lost when you discarded the Belt Drive. It is a long-lived dependable device especially valuable for use with Ball or Babbitt Bearings. SEND FOR BULLETIN No. 24-B.



BROWN ENGINEERING CO.
126 N. THIRD ST. READING, PA.



TOUGHNESS IS BRED INTO THEM

Drilling 22 precision holes at once, full size from the solid metal for a military railway bridge chord member—that's a "big league" assignment.

On jobs of that kind Celfor Drills excel—not only go through faster but hold their accuracy better, for more operations.

That tough, durable accuracy of Celfor Type B Reamers and high speed Twist Drills is no accident. It is bred into them. The Celfor process preserves and utilizes the inherent strength and stamina of finest tool steels. And Celfor Drills—forged to shape and twisted while hot to produce a denser, tougher metal—are unsurpassed for cutting qualities and long lived accuracy.

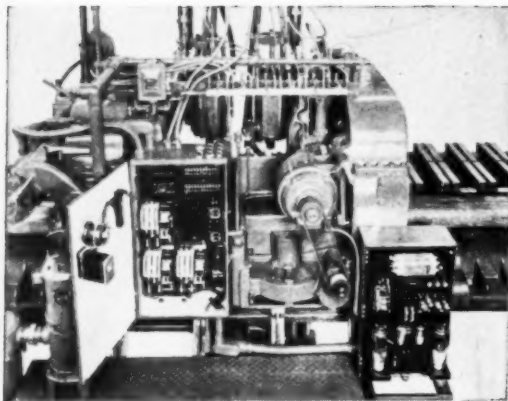
A request for full data on Celfor Twist Drills and Type B Reamers is a sensible step toward substantial savings in tool costs.

CLARK EQUIPMENT COMPANY
BUCANAN, MICHIGAN

CELFOR



Products of CLARK • INDUSTRIAL TRUCKS AND TRACTORS • BOOSTER UNITS • EASY ROLL TRAILER AXLES
AXLES FOR TRUCKS AND BUSES • GEARS AND FORGINGS • ELECTRIC STEEL CASTINGS • METAL SPOKE WHEELS
TRANSMISSIONS • AXLE HOUSINGS • RAILWAY TRUCKS • BLIND RIVETS • HIGH-SPEED DRILLS AND REAMERS



Close-up showing G-E Thy-mo-trol panel and—ac magnetic controller (at left, door open) on the machine. Thy-mo-trol panel at right without cover is for 2-hp motor (center) which drives carriage feed.

which turn at 3,600 and 10,800 rpm, ideal speeds for the aluminum alloys involved. Each cutter is controlled by a follower which travels over a template or former bar as carriage moves from one end of table to the other. Bed and table are long enough to permit machining the

long spars in a single set up. With the four cutters, every type cut required by spar beam design may be made, such as face, slot, and slide milling, twist cutting, beveling, and making cutouts for weight reduction.

Need for a flexible carriage speed con-

BALDOR

BALL BEARING

GRINDERS

STURDY BUILT

for Long, Hard Service



HEAVY DUTY



ASK FOR BULLETINS ON COMPLETE LINE

Above: Baldor Special Carbide Tool Grinder. 1/2 h.p. ball-bearing motor, 6" Silicon Carbide wheels. **\$95.00**
Ask for Bulletin 305A;

At left: BALDOR Grinder No. 101, 1 1/2 h.p., ball-bearing motor; 1725 r. p. m., 220 volts, 3-phase, 60 cy.; **\$90.00**
10" Alloxite wheels.
(Ask for Bulletin 319.)

BALDOR ELECTRIC COMPANY
4368 Duncan Ave., St. Louis, Mo.

FAST, UNIFORM PART MARKING...

If the metal parts you manufacture require accurate marking or numbering for easy identification, this improved Mercury Type Holder is an outstanding help in simplifying your marking job!

This tool holds the entire part number—up to 20 characters if needed. Each character is rigidly aligned and held in place so that, with a single blow of a hammer, the entire number is clearly and neatly stamped on the part. It's fast, fool-proof—and entirely eliminates the time normally consumed when using dies for each separate letter or figure. Moreover, such common errors as wrong sequence, strike-overs, overlapping numbers, etc., are no longer a problem with the Mercury method!

WITH THIS
Improved
MERCURY
TYPE HOLDER!

**INTERCHANGEABLE
TYPE**



And here's an outstanding feature: the Mercury Holder accommodates five type sizes, and all type is quickly interchangeable to meet a whole range of numbering needs. So, with even a single Holder and a selection of type sizes, you can be ready for any numbering job that comes along! The Mercury Holder is compact, important when working with small parts... it is of all-steel machined

construction for long life... it has just four simple parts... and it has many other important features you should know about. Hardened and ground hand cut steel type is available in a full range of sizes.

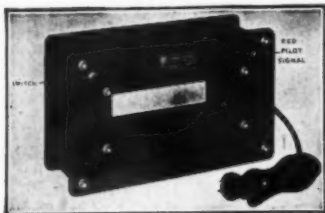
Full details, including ordering data and specifications for both hand and press style holders, are available for the asking. Write Department B today!

IMMEDIATE DELIVERY!



MERCURY METAL DIE AND LETTER CO.
546 EAST 16TH STREET, LOS ANGELES 15, CALIFORNIA

AMC DEMAGNETIZER A TOOL ROOM NECESSITY



Every tool room needs this simple, portable, sturdy demagnetizer. Small parts passed through the powerful AMC field are instantly demagnetized. Large, flat surfaces can be demagnetized by sliding the device over the surface.

Price is only \$32.50, complete as shown.

Write for full information.

ALOFS MFG. CO., Grand Rapids, Mich.



EXTRA LARGE COLLET CHUCKS

Up to 2 3/4"
Capacity

Readily adaptable to machines of all sizes and makes — lathes, screw machines and grinders—and for any operation requiring a chuck.

**IMMEDIATE
DELIVERY!**

Write for Literature!

Territories Open for Representatives

UNITED INDUSTRIES

15930 Liverneis

Detroit 21, Mich.

trol was met by the Thy-mo-trol drive, which assures that cutters are fed to the work at all times in proper relation to changing contours of a spar beam. For example, in one pass over table, depth of cut may increase and decrease several times. Number of cutters entering work may change from one to four. Such varying conditions required a change of feed to avoid overloading of cutter motors. Moreover, a fast "skip" speed was essential to save time when no cutting at all is necessary.

With the Thy-mo-trol system, a-c power is converted to d-c to obtain a stepless speed range with a rheostat-controlled d-c carriage-drive motor. The Thy-mo-trol permits a carriage feed at any speed from 4" to 186" per minute. This infinitely variable speed within the established limits has resulted in top-speed machining of the complex spar beam at all times.

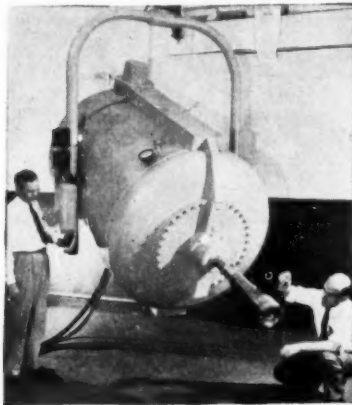
An automatic cam bar feed designed by Onsrud engineers makes it unnecessary for operator to judge maximum speeds at which carriage can be fed during the many different conditions encountered in a pass. During carriage feed, a rheostat-connected follower travels over cam bar, which is contoured accurately in proper relation to the work. Up-and-down travel of follower as governed by the cam varies control of the rheostat, and at every point of the pass the mechanically pre-determined carriage speed is at exact maximum that work will permit.

CLEARLUBE COOLANTS

Two new coolant compounds have been introduced by Clearlube Products Co., 1912 Book Tower, Detroit 26, Mich. One of these, Clearlube Aqua-Cut, is water soluble; the other, Clearlube Petro-Cut, is soluble in oil.

It is claimed that because no free sulphur or fatty acids are used in the basic compounds, these products do not break down, become rancid, or undergo any chemical change regardless of pressure, speed, heat or length of use. They are reported to provide the essential ability to adhere to all surfaces and particularly in the area and at actual point of contact of cutting tool with work. In addition to offering the qualities of effective coolants, both compounds provide an effective rust proofing film.

These compounds contain no ingredients which cause dermatitis, or which might harm the skin or body tissue. No phenol, chlorine or other germicides are required or used in their manufacture.



Dr. Ernest E. Charlton (left) and Willem F. Westendorp check the 2,000,000 volt x-ray outfit recently developed in the X-ray section of the General Electric Co. The new unit doubles the voltage of

X-rays available to industry and will make satisfactory exposures thru sections of steel up to one foot thick.

LEVER TYPE PUNCH

A new lever type hand operated punch has been developed by Whitney Metal Tool Co., 115 Forbes St., Rockford, Ill.

These new punches combine the powerful geared action of the popular No. 4 Angle Iron Shear and the versatility of the Whitney foot presses.

They are made in four throat depths—7", 10", 18", and 24". Punching capacity is $\frac{1}{2}$ " thru $\frac{3}{16}$ " or $1\frac{1}{2}$ " thru $\frac{1}{8}$ " mild steel.

They are furnished with all adaptors and die shoes to take punches and dies to 2" round or $\frac{1}{2}$ " square.

Further details will be sent on request.



No. 2 To No. 6

Screws Driven on this Husky but Sensitive Hopper Feed Screw-driver.

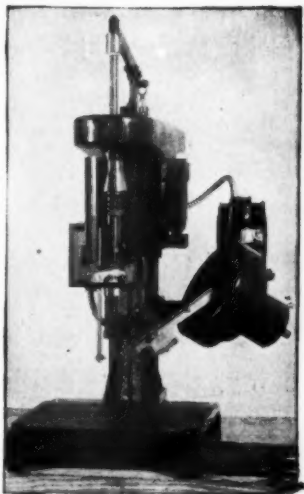
No handling of screws. Just place assembly on table, move from screw hole to screw hole. The machine does the rest.

Drives screws at one second each.

**DETROIT POWER
SCREWDRIVER CO.**

2809 West Fort St.,

Detroit 16, Mich.



WHAT'S NEW IN METALWORKING

MICHIGAN ANNOUNCES IMPROVED GEAR FINISHERS

FOLLOWING its policy of incorporating improvements in machines as rapidly as possible to assist war industry, Michigan Tool Co., 7171 E. McNichols Road, Detroit 12, has announced an improved "Post-War" line of its well-known series 900 rack-type crossed-axis gear-finishing machines. These particular machines have been in wide demand in the aircraft and military automotive industries recently, for producing a high percentage of gears of accurate involute form.

Completely hydraulic in operation, the new series 900 incorporates two separate hydraulic systems, one for operation of table, and one for head feed.

Lubricants and coolants have entirely separate outlets, thereby effectively reducing chance of contamination of one by the other and also permitting ready use of coolant coolers if demanded under extreme conditions.

In addition, automatic lubrication has been extended to the rack table ways which are of hardened and ground dovetail, rather than inverted-V design and



incorporate improved adjustments for wear. Reason for this is said to be extremely long life of the 900 series machines, which frequently produce up to 100,000 pieces before being shut down even for tool grinding.

Improvements have also been provided



SHELDON Back Geared Screw Cutting PRECISION LATHES

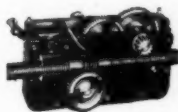
1" Collet Capacity

11¼ Swing

The SHELDON 10"x1" series Precision Lathes, combine the advanced features of extra collet capacity (1-inch), extra swing (11¼ inches), an efficient 4 speed, V-belt underneath drive, and a commodious steel cabinet base. The headslide, spindle and spindle bearing are larger and heavier than is standard for 10-inch lathes, giving not only increased production capacity but also assuring permanency of this lathe's extreme accuracy. SHELDON 10"x1" Lathes have full inch change gears, a worm feed apron with power cross feed and every other essential feature of a quality machine tool, still are surprisingly low in price.

Write for Catalog.

Full Double Wall Apron.
Spindle Drive. Double Wall
Nuts for thread cutting.
Smoothly, operating, efficient

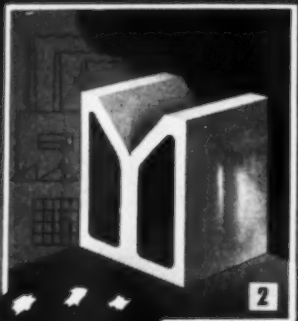


clutch — just a slight turn of
wrist between full release and
position drive. Standard indus-
trial sized controls.

SHELDON MACHINE CO., INC. 4242 N. Knox Ave., Chicago 41, U. S. A.

CHALLENGE

SURFACE PLATE EQUIPMENT



Masterpieces

OF

PRECISION

2" V-BLOCKS

FOR supporting shafts and other cylindrical work when drilling, checking, inspecting, etc. Made from fine-grained, special analysis semi-steel castings, precision ground to the required accuracy.

Speed up accurate alignment and machine work with these handy blocks.

Write for data and prices.

Other Surface Plate Equipment

- | | |
|------------------------------|------------------------------------|
| ★ Box Parallels—
18 sizes | ★ Universal Angle
Irons—4 sizes |
| ★ Angle Plates—
22 sizes | ★ Solid Parallels—
14 sizes |

Buy More  War Bonds!

THE CHALLENGE MACHINERY CO.

GRAND HAVEN MICHIGAN

in the control system to facilitate holding tolerances to even closer limits than previously. During cutting cycle the work is reciprocated at a predetermined rate of speed across the rack while the rack reciprocates longitudinally, in mesh with the work. Controls for both rates of speed are quickly adjustable. In addition, a positive counter is provided to regulate the number of "finishing" strokes desired after vertical feed has been completed to bring work to correct size on pitch diameter.

Electrical controls have also been improved from safety and durability standpoints, with start and stop button stations, etc., operating on 110 rather than power-line voltage.

The machine, notable in the past for rigidity which is important in producing highly accurate gears, has been further strengthened by increasing the structural ribbing in base and column.

The hydraulic down-feed mechanism, as formerly, comprises a rapid approach and slower cutting feed for the head, but is supplemented by the more positive control for finishing strokes at end of automatic down-feed. At end of finishing strokes, head automatically returns to starting position for re-loading.

The new series 900 machine is designed to finish gears up to 8" diameter with maximum length between centers of 18½". The design permits pre-compensating for possible heat-treat distortion of gears subsequent to finishing. Thus, if it is found that a helical gear should have a tendency to "unwind" a few tenths or even thousandths in heat-treat, relationship of rack and work can be set quickly to pre-compensate for that distortion.

A particularly important point in this connection on the new 900 also is the extremely free-cutting action of the serrated racks themselves. This eliminates chance of cold working of gear tooth surfaces, said to be another common reason resulting in minor distortions of gears in heat-treat.

PRESS FOR POWDERED METALS

This 200 ton press was designed for pressing deep sections and flanged objects in powdered metals, wherein one portion of work must be pressed at a different speed than another.

These presses feature independent pressure control, stroke control and speed control of each slide. Separate pumping units are furnished for each slide so that the relation of speeds of the two slides can be infinitely varied to suit a wide variety of work.

An automatic cycle is provided with

STOP

DRILL, TAP AND REAMER BREAKAGE

with **BUFFALO**

TORQUE CONTROL COUPLINGS

Based on the fact that torque and inertia are the fundamental principles of all drilling, reaming and tapping operations, the **BUFFALO TORQUE CONTROL COUPLINGS** are designed to eliminate drill, tap and reamer breakage by acting as a safeguard between the driving power and the tool.

When adjusted at a fixed torque to perform a particular operation, these couplings automatically throw out when over-loaded, thereby severing the driving power thru the coupling itself, but automatically re-engage and re-assume the driving power when the overload has been removed.

Available in single and multiple disc types, in sizes for all operations on drilling machines, lathes, turret lathes, horizontal boring mills, etc.

Also manufactured as **STUD DRIVERS, NUT SETTERS AND TRANSMISSION TYPES.**

Write for complete descriptive Bulletin No. 1005 today!

BUFFALO MACHINERY CO., INC.
838 Grant Street **Buffalo 13, New York**



Machine
Tool Type

SAVE TIME ON INTRICATE **ANGULAR SET-UPS . . .**

MULTI-SWIVEL VISE



Fully universal . . . three swivels simplify the setting of compound angles. Parts interchangeable . . . can be used as a plain flanged vise, a swivel vise or multi-swivel vise.

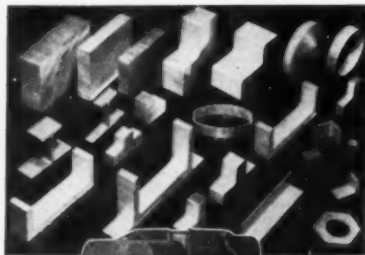
The Platen greatly increases the capacity of the unit. Vise and Platen are interchangeable.

Immediate Delivery
WRITE FOR INFORMATION



MASTER TOOL CO.

161 HIGH STREET • BOSTON, MASS.



CUTS METAL FASTER *More Accurately*

If you require accurate, high-speed cutting of non-ferrous metals and other materials, here is your machine. Cuts by smooth, fast, milling action. Pneumatic hydraulic feed is coordinated with speed of cutting blade. Vise synchronized with action of ram. No vibration because of weight distribution. Has 4 speed transmission and variable feed mechanism. Built-in coolant system. Properly operated, blade breakage is eliminated. Write or wire for free literature.

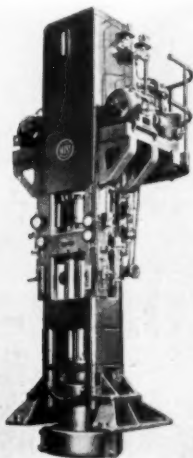
CONSOLIDATED MACHINERY & SUPPLY CO., LTD.
2031 SANTA FE AVE., LOS ANGELES, 21, CALIF.

COMET
AUTOMATIC CUT-OFF MACHINE
MODEL MH

this sequence: quick closing to the work; simultaneous pressing by the two slides at predetermined adjustable speeds and pressures; automatic reversal of upper slide; use of lower slide as ejector; timed pause for loading; automatic return of lower slide.

Presses are available in capacities ranging from 50 tons to 5000 tons. Optional features are automatic loading devices and core rods for bushing work.

In addition to duplex presses, designs are available with as many as four slides, two above work and two below, with independent pressure, stroke and speed control of each slide and automatic sequence as desired. Such presses can also be furnished with or without core rod arrangement and loading devices.



All presses have electric control permitting required sequence to be readily changed in event a different type of work requires a different sequence of slide movement.

Further information may be had from E. W. Bliss Co., Dept., P. M., 53rd St. & 2nd Ave., Brooklyn 32, N. Y.

BAKER DRILLING MACHINE

A special No. 150 heavy duty box column single spindle Drilling Machine has been developed by Baker Bros., Inc., P. O. Box 101, Station F, Toledo, 10, Ohio.

Outstanding characteristics of the machine are extreme flexibility and capa-

**MASTUR
PRECISION
BORING
HEAD**

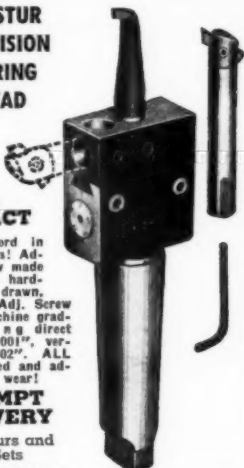
**RIGID
SMALL
COMPACT**

The last word in Boring Heads! Adjusting Screw made of tool steel hardened and drawn, lapped into Adj. Screw Nut, and machine graduated giving a direct reading to .001", vernier to .0002". ALL parts hardened and adjustable for wear!

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on Masturs and
E-Z Sets

Send for individual
descriptive circular.



E-Z SET BORING TOOL

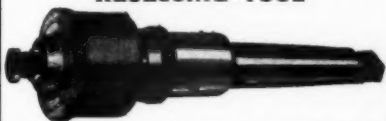


Positive adjustment actuated by worm. Can be used as radius tool. Made in 3 sizes.

**MAXWELL
MEANS
MADE WELL**

MAXWELL-MADE PRECISION TOOLS have been used by satisfied customers for over 25 years. All Maxwell products are unconditionally guaranteed.

RECESSING TOOL



Grooving, Recessing, Back-facing, Ball bearing pilot; operation instantaneous. 4 sizes—1", 2", 3", 4".

F. A. MAXWELL CO.

BEDFORD, OHIO

DEPT. D

*Light,
Easily
Handled,
Flexible*



**SWEDISH
INTERNAL
INDICATOR
GAGE**

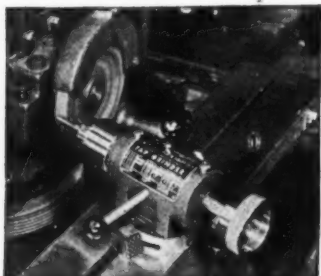
A reliable precision indicator especially designed for rapid, convenient and accurate measurement of internal diameters. Variations of as little as 0.00005" in size, out of round, and taper of bores can be quickly determined. Hundreds are in daily use on production lines and in inspection departments on innumerable applications where close limits on size, roundness and straightness of bore are of prime importance.

It can be set to any required size direct from Johansson Gage Blocks or Master Ring.

SWEDISH GAGE CO., OF AMERICA

8900 ALPINE AVE., DETROIT 4, MICH.

DON'T DISCARD DULL TAPS



READING TAP GRINDER

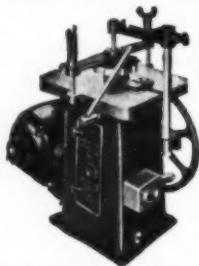
Can be used on almost any type of tool and cutter grinder, surface grinder—even bench lathes. Tap is held in chuck—may be sharpened after center is destroyed. **No collets.** Complete. No extras. Write!

- Built-in chamfer protractor.
- Simple shifter for 2-3-4 flute taps.
- Variable relief thru adjustment screw.
- Easy - to - follow chamfer diagram on index plate.
- Capacity to $\frac{3}{4}$ " hand tap.

ORDER NOW!

★ ★ ★ READING BROACH KEYSEATER

The Reading Bench Machine does not require bushings or guides. No other machine like it. Very fast capacity from $\frac{1}{8}$ to $\frac{3}{8}$ cutter. Low first cost — prompt delivery.

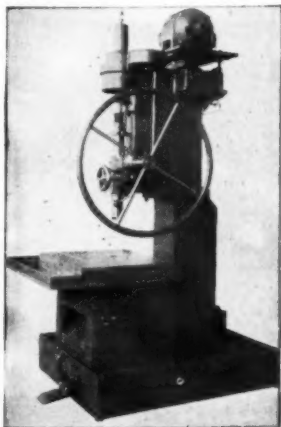


READING MACHINE CO.

READING (CINCINNATI) OHIO

city for an unusually wide range of work. It is built in either single purpose or quick change type for operations on large size pieces requiring large table chucking area and increased distance from center of spindle to face of upright column.

The machine was designed for test drilling in centers of sides of square alloy test pieces with a Brinell hardness of 285 to 321. Maximum size of test pieces is 2"x24"x24". To accommodate these large pieces, distance from center of spindle to base of frame was increased to 14" instead of the standard 11 $\frac{1}{4}$ ".



A special large size stationary box type table with T-slots was provided on base of machine. Also a 38" dia. handwheel is furnished instead of the standard capstan handle. To facilitate raising and lowering the spindle from the front working position, due to the front over-hang and size of working table, a foot treadle is provided for convenient actuation of the automatic machine feed.

Machine illustrated is of a single purpose type, but the standard universal machine with quick change of speed and feed can also be provided.

AUTOMATIC COOLANT SEPARATOR

The Magnetic-Automatic Coolant Separator developed by Barnes Drill Co., Rockford, Ill., is said to embody a new method of automatically removing harmful metal and abrasive particles from honing coolants having a non-soluble base.

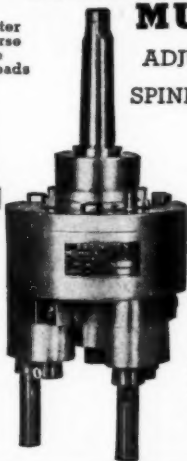
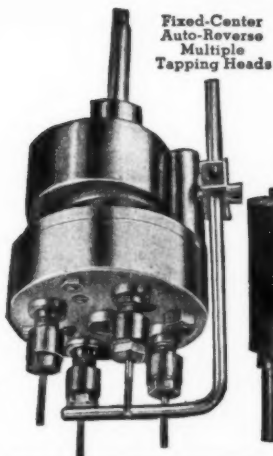
ERRINGTON MECHANICAL LABORATORY

STAPLETON, STATEN ISLAND 4, N. Y.

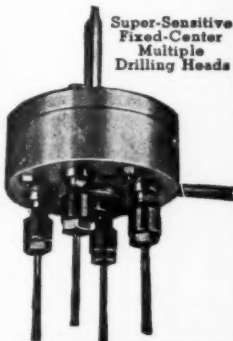
6701 N. SIOUX AVE., CHICAGO

MULTIPLE HEADS

ADJUSTABLE MULTIPLE SPINDLE DRILLING HEAD



All Parts
Fully
Enclosed
to Insure
Pressure
Lubrication
and
Rigid
Support of
Adjustable
Spindles



The COLBORNE Speed Lathes

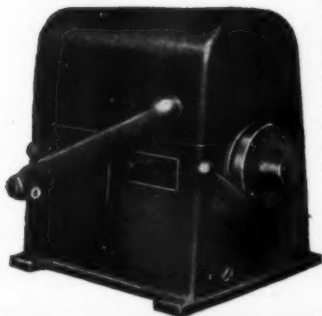
SPEED UP FINAL OPERATIONS ON DIES . GEARS . SCREWS . LONG RODS

A recent addition to the COLBORNE line of Speed Lathes is the Series 30 machine. This speed lathe is indispensable for economical polishing, grinding, burring and lapping.

Very compactly constructed to do highest quality work with the COLBORNE features of spindle bearings running in oil, instant stopping brake, easy opening collet and standard speeds of 600-920-1720-3280-4800 RPM using $\frac{3}{4}$ H.P. motor and cone pulleys. Collets and chuck may be used.

For more production per day choose COLBORNE.
PROMPT DELIVERIES

Write for Details Today.



COLBORNE MFG. COMPANY

BUILDERS SINCE 1879

157 Division St.

Chicago 10, Ill.

GAGES



In 48 Hours (in many sizes)

Plug Gages, Ring Gages, Snap Gages
(adjustable and solid). Flush-Pin
Gages, Built-up Gages.

OUR GOOD GAGES

Prevent Spoilage
Speed-Up Operations
Utilize Less Skilled Help
Reduce Costs

EASTERN PRECISION GAGE CO.

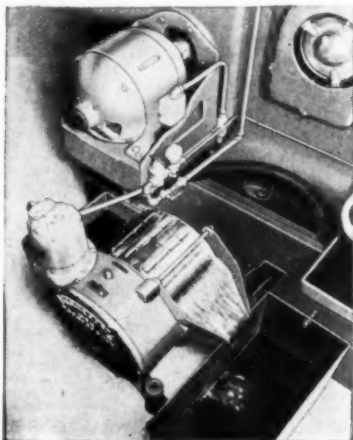
320 Bayway, ELIZABETH 2, N. J.

We operate day-and-night.
Phone us at any hour,
Elizabeth 2-9519

Send for illustrated folder B

It is automatic in operation, which allows operator to devote full time to productive work. No filters are employed and all swarf and magnetic particles are automatically removed thru magnetic attraction. Operator can observe drum to determine stock removal.

The Separator is a self contained, motor driven unit, employing a magnetic rotary drum, which attracts metallic particles as they pass thru the coolant and carries them out as the drum rotates. Drum is constructed of a series of permanent magnets mounted all the way around the inside and rotating with it. Coolant flows rapidly in a thin wide channel thru lower part of Separator in a counter direction to the slow rotation of drum. The metal and abrasive particles form on the drum and extend on end in a definite brush-like pattern. Then, as the drum rotates, the entire sludge mass is scraped off and discharged thru a chute into a movable pan. Constant swarf removal maintains reservoir storage. There is no temperature rise and coolant returns to reservoir, ready for immediate recycling.



Where gravity feed of coolant from machine to Separator is impracticable, a motor driven pump may be used for transferring used coolant into Separator. After coolant is cleansed, it is carried by gravitation from Separator into the cleaned coolant reservoir.

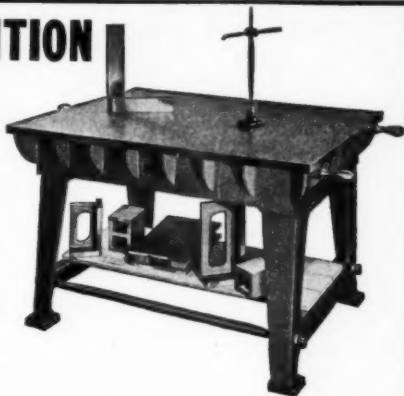
Separator is easily installed and can be

A USEFUL ADDITION

Modern precision machine shops and inspection departments will find this sturdy 36"x 48" MILWAUKEE SURFACE PLATE a valuable addition. Constructed of semi-steel, accurately machined, securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate 30". Can also be had in 38". Shipping weight 1200 lbs.

We also manufacture angles and parallels as shown underneath surface plate.

We also make larger and smaller plates either with planed or scraped surfaces, whichever is desired. Write today for full information.



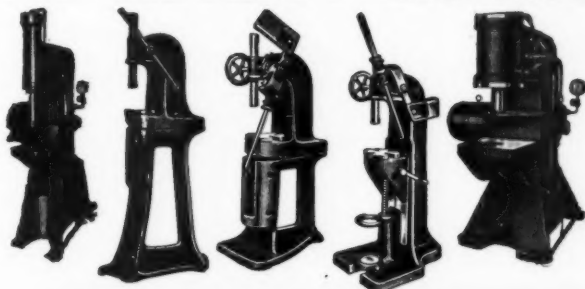
J. C. BUSCH COMPANY

165 SO. BARCLAY ST.,

ENGINEERS AND MACHINISTS
SINCE 1907

MILWAUKEE 4, WIS.

For AIRCRAFT and MUNITIONS



**1883
GREENERD**

The Originators
of the
Arbor Press

1944

PRECISION WORK IN MANUFACTURING

65 Standard Styles and Sizes. Manually operated presses $\frac{1}{4}$ to 35 tons pressure. Motor driven hydraulic presses $\frac{1}{2}$ to 30 tons pressure.

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GREENERD ARBOR PRESSES

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Announces
A BRAND NEW LINE
OF FOOT-POWERED
SQUARING SHEARS



● A new, low-cost, foot-operated (motorless) squaring shear has been developed by Famco . . . the result of many months of designing, engineering and testing. It's extremely powerful . . . ruggedly built of semi-steel . . . accurately machined and will cut up to 18 gauge mild steel. Cross head is reinforced. Compressing springs are encased. Knives have tool steel cutting edges. Available in 22", 30", 36", 42" and 52" cutting widths. All models are equipped with front, back and side gauges. "Hold-down" attachment is furnished with the 36", 42" and 52" sizes. Write for information and prices on this new line of machines.

FAMCO MACHINE COMPANY

1320 EIGHTEENTH STREET • RACINE, WISCONSIN



Famco builds 32 models of bench and floor type Arbor presses.

Famco Foot Presses are made in 10 sizes for bench or stand.

Arbor Presses • Foot Presses • Squaring Shears

successfully applied to Honing Machines of both vertical and horizontal types. It may also be used on grinding machines when a soluble solution is used as coolant. May also be used on other types of machines where minute particles of magnetic material are suspended in the flow of coolant.

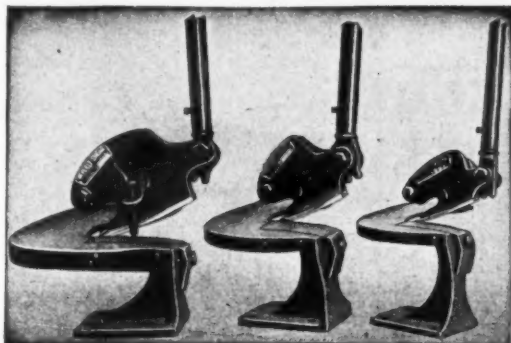
Two sizes, both employing $\frac{1}{4}$ h.p. motors are now available. Capacity of the smaller Separator is 10 gallons of coolant per minute, while the larger size is capable of handling 20 gpm. Other sizes can be supplied if necessary. Weight of smaller size is 500 lbs net; of the larger, 600 lbs net. Bulletin 151-A gives full details.

ALL-PURPOSE DISC GRINDER

A new all-purpose disc grinder for any type of metal, wood or plastic material has been developed by the Kindt-Collins Co., 12651 Elmwood Ave., Cleveland, 11, Ohio. It is made in two similar models, regular and heavy-duty; the regular model using cloth or paper abrasive discs, and the heavy-duty model employing an inch-thick, heavy-duty grinding disc.



Principal features of design and construction are: the 30" disc with 26" high grinding area; hydraulic controls which eliminate all gears, worms and jack screws ordinarily employed for raising, lowering and tilting table; an accurate position stop provided on protractor for stopping table in any position from 45° down to 15° up; ventilated table with



Get BEVERLY Throatless SHEARS

SAVE TIME ON WAR ORDERS!

If you're cutting straights or irregulars on War orders you can speed 'em up with a BEVERLY Bench-Type Shear. Order No. 1 for 14 Ga., No. 2 for 10 Ga., No. 3 for 3/16" mild steel and 10 ga., stainless.

THE BEVERLY SHEAR MFG. CO., 3005 W. 110th Pl., Chicago 43, Ill.

THE
New

DEARBORN
MODEL
"B"

**CHUCKING
and INDEXING
FIXTURE**

FOR USE ON MILLING MACHINES

The Dearborn Fixture meets the demand for automatic chucking and indexing, permitting several operations on the same piece with only one setting. Its simplicity of design, high precision, milling accuracy and speed of operation has led to its adoption by many of the leading manufacturers thru-out the country.



Work held by automatically opening and closing collets. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces.

Write for
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J. W. DEARBORN

**ANSONIA,
CONN., U. S. A.**

POWER FEED For Facing

BORING, TURNING, FACING, UNDERCUTTING COMBINED IN ONE TOOL HEAD

The power feed feature for facing operations insures smooth, uniform movement of tool across work surface. This power feed can be engaged or disengaged instantly. Adjustment of tool for boring is obtained in increments of 1/10,000 in direct reading.

All
Operations
In One
Set-Up

Patent
Pending



For
Jig Borer,
Drill Press,
Milling
Machine

Cutting bar can be set to any position in Tee slot of slide. Hardened and ground throughout. Feed screw and worm ground from solid. Gears and feed nut phosphor bronze. Head 3" dia. x 4" long. Wt. 9 lb. Any type shank furnished. Write for complete information.

CHANDLER TOOL CO.
514 OHIO AVE., MUNCIE, IND.

**CHANDLER
DUPLEX**
BORING AND FACING TOOL HEAD

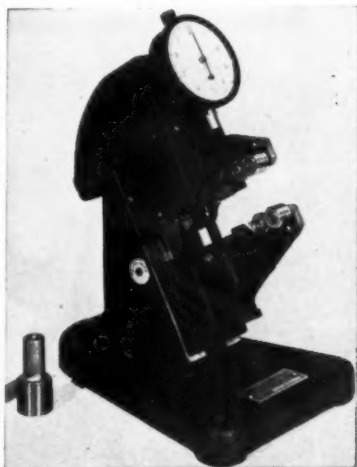
properly placed perforations to channel dust into the dust guards; and paper or cloth discs may be removed and replaced without removing steel disc.

A conveniently located handle operates hydraulic valve and a 10" handwheel controls every hydraulic operation. Start and stop button control is mounted at eye level on front of machine. The table, 37½" from the floor, will tilt 45° down and 15° up, and can be lowered to 4" from bottom of disc. Protractor degrees are large and clearly engraved.

Motor is mounted on a hinged pedestal over the shaft, driving main shaft thru 3 V-belts and thus making possible highly accurate speeds for efficient grinding. Disc speed is 800 rpm, giving a rim speed of 6260 fpm. Regular model is equipped with a 3 hp. ball bearing, 1150 rpm, a-c, 2 or 3 phase motor, while heavy-duty unit uses 5 hp motor of the same type.

Floor space required is only 41x38½". Over-all height is 57½" and total shipping weight is 2100 pounds.

P & W OFFERS NEW COMPARATOR



Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn. has introduced a new Roll Thread Comparator with pressure control. It is based on the same principle of "go" and "not go" thread rolls used in P & W Roll Thread Snap Gages for many years, but now this principle is combined with a



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Be Accurate
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DRILL JIG BUSHINGS

There's no guesswork when your jigs are equipped with Acme Bushings. On the contrary, accurate drilling is assured, because drill jig bushings from Acme are produced by specialists in precision manufacture.

Acme offers two complete bushing standards, the A.S.A., plus the Acme standard line. Because of this you may be enabled to eliminate many special bushing requirements to save time and money.

You are invited to write for details on Acme's complete line of products and services offered to the precision working field.



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Makers of Standardized Jig and Fixture Bushings

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Telephone: MONroe 4122

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We Solve

TOUGH TOOLING PROBLEMS

GUARANTEED ACCURACY — PROMPT DELIVERY

**We specialize in precision
work and in getting it out
ON TIME!**

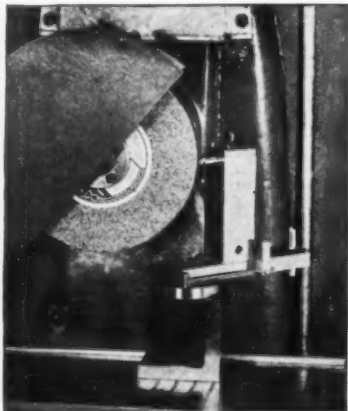
End Mills, Reamers, Counter-
sinks, Dovetail and Circular
Form Tools, Shell End Mills,
Gages of all Types,
Centerless Grinding.

**For Quick Quotations, Write—Wlrp
or Phone BUCKingham 3417**

ANDERSON AND QUIGLEY CORPORATION

2329 Nelson Street, CHICAGO 18, ILLINOIS

The FORM-MASTER ANGLE AND RADIUS DRESSER



An all-purpose angle and radius dresser for high-precision at low cost. Accurate easily within .001". Simple to operate. Dresses in horizontal position enabling operator to SEE the form in work. All parts hardened and ground (except cast-iron base which can be drilled and tapped). Suitable for surface and cylindrical grinders. Two 1/3 ct. diamonds and instrument case included. \$150.00 complete.

It readily produces: Any desired angle; Convex radii to 4"; Concave Radii to 7". On 7" wheel.

Specifications: Base 3"x3", height 8 1/2"; Wheel capacity 10"; Angular travel 3".

For information or a demonstration
CALL YOUR SUPPLIER.

MANUFACTURED BY

J. & S. TOOL CO. 477 Main St., East Orange 2, N. J.

PRECISION DRESSING TOOLS

dial indicator pressure control on both sets of rolls that provides for very close tolerance thread inspection.

When close tolerance threads are being checked by inexperienced or "heavy handed" inspectors using standard roll thread snap gages, the parts might be snapped thru both sets of rolls and rejected when they actually are correct. It is for this sort of inspection that the pressure control model was pioneered and developed by P & W. As work passes between the "go" rolls, any movement of indicator pointer means an oversize thread. On the other hand, the pointer must move as work contacts the "not go" rolls if the thread is correct. Lack of movement at the "not go" rolls means undersized work. All "feel" or judgment by operator is eliminated.

The comparator consists, as illustrated, of a rigid base casting and main frame which carries indicator bracket. Frame carrying the upper pair of rolls contacts indicator and is supported by reeds which provide for a vertical motion. The lower pair of rolls are supported in a frame which is adjustable on its slide but locks solidly in desired position. A vertical adjustable screw holds the two roll frames apart at exact setting with indicator at zero.

The gage is adjustable over a range from 1/4 to 1 1/2" diameter and uses a gaging pressure of approximately 2 lbs. Indicator graduations are .0001", which allows gage to be used for classifying if desired. The gage stands 12 1/2" high and weighs approximately 16 lbs. Thread rolls of any desired pitch are available, as well as "go" and "not go" setting plugs for any given thread.

PROCESSING CARRIERS

Manufacturers whose products or metal parts go thru various finishing processes will be interested in the new "Processing Carriers" Catalog B-6 produced by Rocklock, Inc., 1350 Kings Highway, Fairfield, Conn.

The 24-page edition pictures and describes more than 100 custom-built metal baskets, trays, crates, barrels, boxes and fixtures that have been designed to solve specific problems for better handling of metal parts. The carriers are sectionalized both under Heat Treating with all its various processing operations, Fixtures, Pickling Equipment, Plating and Finishing and Metal Tanks, and under design types of Carriers.

There are many interesting examples of unique construction in the section covering bottom dumping baskets and a wide range of shapes and sizes with capacities from a few ounces to 6000 lbs.

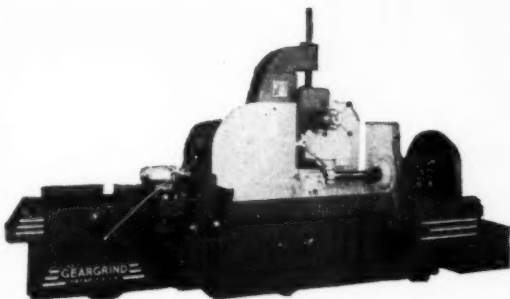
FORMED WHEEL GRINDER

A new heavy-duty formed wheel grinding machine, Geargrind Type GG-24-48, has been announced by The Gear Grinding Machine Co., Detroit, 11, Mich.

It handles either coarse or fine pitch gears with diameters up to 24". It takes 48" between centers. The base is extremely heavy and the grinding wheel column is exceptionally rigid.

It is claimed that production has been more than doubled with this machine, due to a combination of many advanced features which include much faster indexing, more rapid travel of work table to and from work, simplified push button controls and operator convenience.

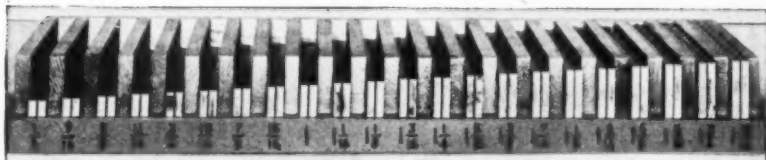
The low base provides a low center line of work. Work areas are painted spot light buff. The result is better visibility, easier, faster inspection, and increased safety for operator.



Index control is such that indexing can function at both ends of stroke or on tail stock end only.

Index cycle stop is selective from 0 to 400 indexes and may be adjusted at any point in cycle.

Travel of grinding wheel carriage to wheel trimming position is automatic. This automatic travel can be made after any predetermined number of cycles



Attention: Tool Supervisor

Compare Price and Accuracy

ANTON STEEL PARALLELS

Hardened and Ground

Width $\frac{1}{4}$ "

Accuracy

Length 6"

Within .0001" in Parallelism and Straightness on ground sides over entire length of 6", equal to about 17 Millionths per inch.

Sold to customers only

Depth of Hardness

Hardness

About .040"
Rockwell C 64 \pm 4

COMPLETE SET OF 22 PAIRS from $\frac{1}{4}$ " to 1-13/16" in height in steps of 1/16", with case, as illustrated, \$85.—net, F. O. B. New York, N. Y.

Sold in complete sets only and ON MONEY BACK GUARANTEE

THE MOST IDEAL SET OF PARALLELS WHICH SHOULD BE IN EVERY TOOLROOM AND INSPECTION DEPARTMENT

IMMEDIATE DELIVERY ON HIGH PRIORITY

EASTERN MACHINE AND TOOL COMPANY

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New York 7, N. Y.

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No traffic interruptions when you patch broken concrete with durable **INSTANT-USE**. Material comes ready mixed. Simply shovel into hole, tamp and run traffic over immediately—without waiting. Bonds tight to old concrete. Makes smooth, solid, lasting patch. Withstands extreme loads. Keep a drum on hand for emergencies. Immediate shipment.



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information . . details of **FREE TRIAL OFFER**
—no obligation.

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Company

Address

(complete revolution of work) or it may operate as a tooth to tooth index.

In case of index failure an electrically interlocked safety circuit stops all movement of grinding wheel carriage.

The motor driven work-head spindle permits checking work runout with an indicator. This spindle is mounted on precision tapered roller bearings.

The 33" diameter index worm wheel is driven by a precision hardened and ground worm 4½" in diameter mounted on precision tapered roller bearings. Both worm and wheel run in oil. On GG 24-30, diameter of index worm is 28".

Index change gears are hardened and precision ground.

Machine takes either a 4 to 1 or 6 to 1 trimmer.

Piping and hydraulic pump are located at rear, enclosed in a removable cover.

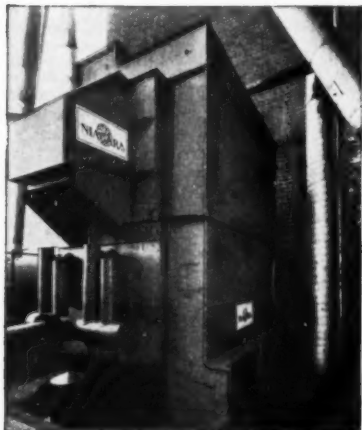
DALZEN "2-IN-1"

A single machine which performs both center lapping and drill press operations, is announced by Dalzen Tool & Mfg. Co., 12255 East Eight Mile Rd., Detroit 5, Mich. Said to cost less than many single purpose center grinders, this dual purpose machine affords savings in equipment costs and floor space.



One simple adjustment, requiring only a few seconds, is all that is necessary to change over the "2-in-1" from center grinder to drill press or vice versa. Simply lift a pin and swing center grinder

**Improved After Cooling Method
Dries Compressed Air More
Thoroughly and Saves Cooling
Water Costs**



You protect all air tools, grinders, hammers, riveters — from water damage, from freezing and from loss of lubrication when the air is thoroughly dried in the **NIAGARA Aero AFTER-COOLER**. An *evaporative* cooler, it does not consume water, but repays its cost by eliminating water bills. It also provides controlled temperature for jacket and intercooler water with the Niagara "Balanced Wet Bulb" control.

Write for Bulletin 96 and 98

NIAGARA BLOWER COMPANY

Over 30 Years of Service in Industrial Air Engineering

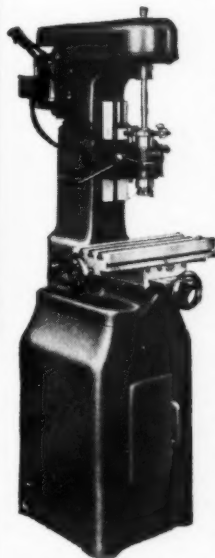
Dept. MT-124, 6 E. 45th St., New York 17, N.Y.

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AIR ENGINEERING EQUIPMENT

Speed **FOR YOUR** **TOOLMAKERS**



Toolrooms will be taxed beyond capacity when civilian production calls for new dies, jigs, metal patterns, models and an endless variety of small machining jobs.

You will find the Linley ideal for taking over this work... saving your larger equipment for its rated capacity. It has 8 speeds, to 4250 r.p.m.; direct micrometer setting, velvet feed, quill travel without backlash, grease-sealed bearings, ample table travel, and requires only 18½" x 20" floor space.

High speed, extreme accuracy, quick set-up and changeover are built into this trouble-free machine that will quickly pay for itself in volume of profitable work.

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Empire LIVE CENTER

With Interchangeable Points

ACCURATE • VERSATILE • HEAVY DUTY

THE TAPERED
SEAT ASSURES
ACCURACY OF
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Empire Toolmaker's
Set available in
wooden case—
each tool in
its own re-
cess.

Points for Various Operations

- A. Very large, for pipe or tubing work
- B. Extra long point used in facing operations
- C. Extra wide point for large diameter work
- D. Standard point
- E. Blank made of soft tool steel for nests
- F. Female for work not having centers

Send for Literature



Mfd. in all tapers,
straight shanks,
and specials.



70 SPRING STREET • NEW YORK 12, N. Y.

dresser in or out of position. Illustration shows the tool being used as a drill press with the dresser swung "out of position".

It is portable, weighing only 165 lbs. Height is 67" and the floor stand measures 15x21". The 10x10" work table is smooth and slotted for T-bolts. Standard length between centers is 39" but other lengths are available. Capacity of drill press, which will drill to the center of a 13" circle, is 1/2". Dresser is adjustable from 20° to 100°. The spindle rotates on two precision ball bearings, with a double bearing at lower end to take thrust. Tool is shipped complete with 110 volt motor, V-belt drive, diamond, and 1 1/2" lapping stone.

BARKLING FURNACE

A new, pedestal type, multi-purpose Heat Treating Furnace is now being produced by the Barkling Fuel Engineering Co., 400 N. Paulina St., Chicago 22, Ill., which provides three heating areas in the one installation.

It has an indirect heating chamber for hardening, annealing, stress relieving and carburizing; with door opening 4 1/2x8"; a direct heat chamber for heating, for tool dressing, forging, bending; with opposed openings in front and back 2x4 1/2"; and a tempering surface on the top for tempering tools and dies.



The indirect heating chamber has a "U"-shaped hearth 6" between ribs and 8" deep which can be replaced thru the

LEACH External Grinder

\$875.00

Fully Equipped

Grinds work from $\frac{3}{4}$ " to 11" in length and from $\frac{1}{8}$ " to 7" in diameter.

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USE

Fluid-Motion for Modern form-dressing

ONE

**SETTING
HANDLE
CONTINUOUS MOTION**

The J & S Model "E" Radii and Angle Dresser in the new "Fluid-motion" series is one of the finest precision dressing instruments procurable—regardless of cost.

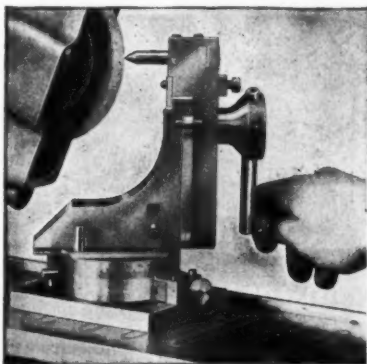
FEATURES

Fluid-motion dressing
.0001" accuracy
Automatic centering
14" wheel capacity
Large range yet compact
Chatterless and dustproof

J. & S. TOOL CO.

477 MAIN ST.

E. ORANGE 2, N. J.



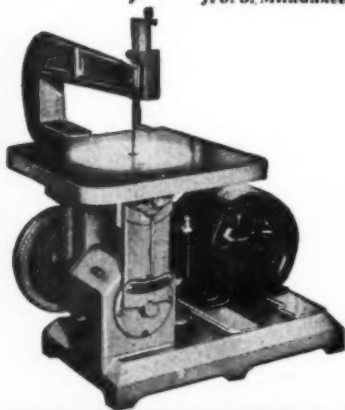
ATLAS DIE FILER

This sturdy and well designed bench type machine, for rapid and accurate die filing and sawing, will eliminate many costly hand operations.

Complete
with motor
and saw at-
tachment at

\$125.00

J. O. B. Milwaukee



**Milwaukee Chaplet
and Mfg. Co.**

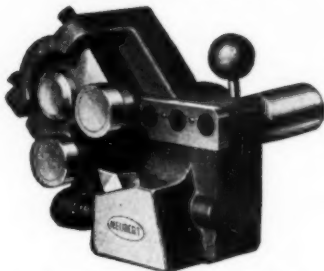
1023 S. 40th St. • MILWAUKEE, WIS.

door. Interior scales over 410 cubic inches and heats to a temperature of 1500° F in 10 minutes, 1900° F in 29½ minutes. Temperatures up to 2500° F are obtained in the direct heat chamber.

Maintaining of constant heats, without customary fluctuations, is said to be made possible by the Barkling Air Relief Valve, operating in conjunction with a specially designed blower which eliminates variations in pressure. Overall dimensions of Furnace are 25" wide, 19" deep and 53" high.

Other features include counterbalanced door, gas-air ratio mixing valves and capped connection for attaching pot type furnace employing single blower for both units. Unit is described in Bulletin 104, sent on request.

NEUBERT BAR TURNERS



A new type of bar turner has been developed by Neubert Machine Co., 341 W. Willow, Long Beach 6, Cal. Available in ¾, one and 1-¾" sizes, these roller turners are quickly set up. The heavy duty roller bearings are mounted on large center studs for heavy loads. They allow free turning on light cuts and can be set either ahead or behind the cut. When set behind the cut, they roll or burnish the work to a smooth finish.

The retractable tool slide allows cutter to be withdrawn from the work by means of the lever. This prevents marking of work on return stroke.

The narrow width prevents interference with cross slide tools, permitting the latter to be set closer together.

Construction is extremely sturdy and rigid, with heavy body and substantial tool slide. Ways are hand scraped. Body and tool slide are heat treated high tensile Meehanite with a tensile strength of

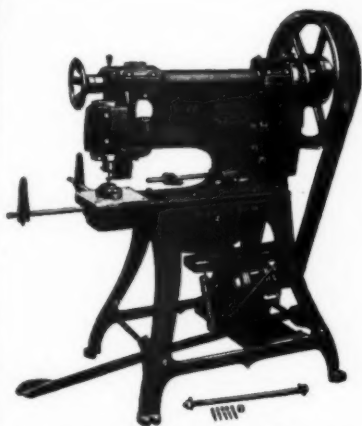


JANETTE SPEED REDUCERS

Your **SLOW SPEED** machines of from .08 r.p.m. and higher, 1/50 to 10 H. P., can be driven without using belts, pulleys, line shafts, chains, sprockets or slide rails, if you use one of the **47 types** of Janette speed reducers.

WRITE for our 100-page Catalog **TODAY.**

Janette Manufacturing Co.
556-558 W. Monroe St.
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No. 20 Deep Throat Power Punch and Press

Write
ASK US ABOUT
This Machine
and the
System
of efficiently
Punching
Sheets in Duplicate
Thousands
All Over the
World

There's a Reason!

EXCELSIOR TOOL & MACHINE CO. EAST ST. LOUIS, ILLINOIS

60,000 psi. Steel parts are hardened and ground.

The makers emphasize that these turners are especially adapted for use with carbide cutters. The upright position of cutter gives ample chip clearance and allows cutter to be reground without destroying original shape and clearance angles.

DIAMOND-IMPREGNATED DRESSER

Wheel dressers made with small commercial diamonds set into a matrix of Carboloy cemented carbide have made possible a considerable saving in time and money at a Detroit aircraft engine plant, where they are being used to true-up recesses in finish grinding wheels employed to grind the O.D. on aircraft cylinder sleeves.

When a conventional single diamond dresser was used for the recessing operation, which is necessary in order that the grinding wheel may produce a sharp corner at bottom of the cylinder sleeve's flange, the holder had to be ground flat and the diamond lapped so the stone would perform the dishing-out operation correctly without the holder touching edges of the recess when swinging it thru an arc.

The Carboloy diamond-impregnated



dresser, contains diamond particles distributed thruout the matrix. This insures that at least one or more of the stones will be in contact with the grinding wheel at all times as holder is swung thru a small arc. Moreover, new cutting faces are presented to the abrasive wheel as layer after layer of diamonds are reached and exposed, due to the gradual wearing-away of the carbide matrix. Hence, no lapping and no re-mounting are needed.

THEY WORK AROUND THE CORNERS

MILLER

FLEXIBLE DRIVE SOCKET SET

FLEXIBLE SCREW DRIVER

MILLER FLEXIBLE SCREW DRIVER—A practical, durable screw driver that actually "works around corners." One of the most valuable small tools ever put into a shop.

Saves loss of time and temper on jobs in awkward places that can't be reached by a straight or offset driver.

Laminated steel shaft; specially hardened screw driver bit. Shock-proof handle. Length overall 8". Price, 85c.

Efficient in production and assembling operations or for servicing small machines

MILLER FLEXIBLE DRIVE SOCKET SET—Same construction as Screw Driver. Set contains 6 Hex Sockets from 3/16" to 1 1/2" and flexible drive 10" long. All packed in handy metal box. Price, \$3.00.

Obtainable under CMP-5 — MRO.

L. B. MILLER COMPANY

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Shaft of
Laminated
Steel
Wire, not
a Coiled
Spring.

U. S. Pat.
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You'll wonder
how you ever
got along
without them.

Speed up Bench Lathe **PRODUCTION**

**WITH...The Help of The
Handiest Tool in
Your Shop**



Installed or removed in less than half a minute.
See your nearest dealer or order direct.

Leclair Lathe Spindle Stock Stop (Depth Control)

**For Collet and Chuck Work
From 1/8" to Full Capacity**

- Just a twist of the finger and the stop is all set. Insures correct length. Positive and accurate.
- Absolutely will not whip at high speeds. Will hold tolerances.
- **2 STOPS IN EACH SET** to accommodate short or long pieces.
- Made up in a complete set for use with or without collet closer.
- Saves many valuable man hours.

975

**COMPLETE SET
IMMEDIATE DELIVERY**

F.O.B. Desplaines, Ill.
WHEN ORDERING: Specify make of lathe, inside diameter of spindle, inside diameter of collet closer.

Fits all bench lathes. 1" capacity and over available at extra cost.

W. Q. LUNDMARK

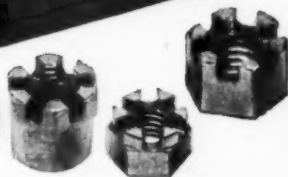
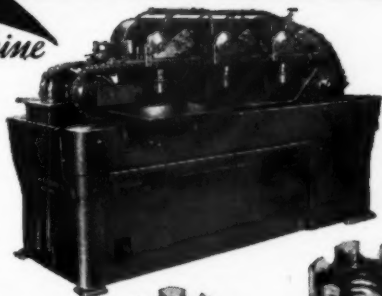
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"DUPLIX" Nut Slotter!

Special Purpose Machine

**Slots 2 Sizes
at Once . . .**

Two continuously operating conveyors
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Automatic burr removal ... As high
as 3000 slotted nuts per hour ... Two
machines covering hexagon sizes from
3/8" to 2 1/2" ... **ALSO ADAPTABLE
TO MILLING OF PARTS OF SIZES
COMPARABLE TO NUTS.**



PELLOW MACHINE Co.

13510 FOLEY AVE., DETROIT 27, MICH.

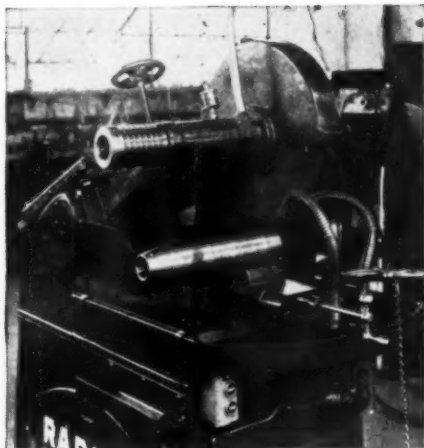
CUTTING-OFF SHELLS

A. P. De Sanno & Son, Inc., Phoenixville, Pa., report that it requires from seven to eight seconds cutting time to cut off the 1½" end of a 105 millimeter shell on the Radiac Abrasive Cut-Off Machine—Wet Type "J" as shown. The "end" is the portion of the shell which remains after having been turned to shape in a lathe.

After the piece has been cut off as closely to the shell as possible (with a Radiac synthetic rubber bonded disc 18" x 3/32" x 22" mm RB 506 NE), a facing operation follows.

Note that the vise is arranged so that it clamps the shell and supports it on both ends. In order to expedite handling, a foot treadle is provided for opening and closing jaws of the vise.

This is one of the many important war-time applications of modern abrasive wheel cut-off machines.



DESMOND GRINDING WHEEL DRESSERS



Desmond Hex Dresser



Desmond Heavy-Duty Dresser



Desmond Huntington Dressers

Our Desmond Huntington Cutters are made in all sizes.



We manufacture only complete line of dressers and cutters on the market, and will be glad to send samples for trial. Write for copy of our new catalog and name of your nearest jobber.



THE DESMOND-STEPHAN MFG. CO.
URBANA • OHIO

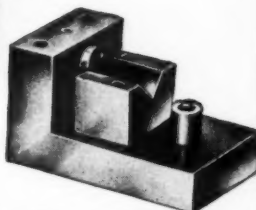
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**We also build
JIGS, FIXTURES
and SERVICE TOOLS**

Available in standards, or made to your own blueprint specifications, also chrome plated and carbide tipped. We are prepared to assist your overburdened drafting department in designing your gages and tools.

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PENDING

Exclusive Features

- ★ Tapered Roller Bearings
- ★ Preloaded for Rigidity
- ★ Point Ground After Assembly for Maximum Accuracy
- ★ Heavy Duty Bearing Seal
- ★ High Load Carrying Capacity

HEAVIER CUTS — HIGHER SPEEDS — MORE PRODUCTION

Morse tapers in stock — specials of all kinds.

Write direct or call your jobber.

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BW-COPYFLEX PRINTER



JEFFERSON SWING FRAME GRINDER and POLISHING MACHINE

Takes grinding wheels up to 14"x2 3/4". For grinding and snagging castings or for polishing, buffing large sheets, tubing, bars and unwieldy shapes. Can be swung forward, backward, up, down, right and left, and at any degree of angle.

WRITE FOR ILLUSTRATED LITERATURE



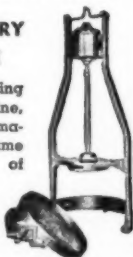
Above Illustrated

JEFFERSON ENDLESS BELT SANDER

For wood or metal finishing. An economical machine which eliminates costly hand sanding and finishing. For either large, small, flat, concave or convex surfaces.

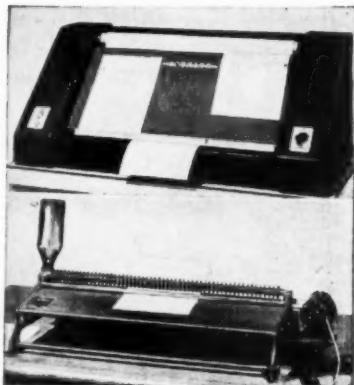
JEFFERSON GYRATORY FOUNDRY RIDDLE

... for screening, moulding and core sands. For fine, medium and coarse dry materials. Note hinged frame which permits change of sieve. Has capacity of 10 men riddling by hand. Over-all height 60".



JEFFERSON MACHINE TOOL CO.

700 W. 4TH ST. CINCINNATI 3, OHIO



New production advantages, as well as double utility, are claimed for a machine recently announced by Charles Bruning Co., Chicago. The BW-Copyflex Model 2 Continuous Printer, makes it possible to duplicate anything drawn, typed, printed or illustrated, as well as to make BW Prints, providing complete reproduction facilities for any type of industry or business.

This Printer exposes, with the use of Copyflex materials, tracings, line drawings, specifications, Van Dyke negatives, blue prints, etc. Original material with copy on both sides can be reproduced on either side or both sides. Prints are developed in trays and dried in a simple drier (readily available). With flick of a switch, Model 2 becomes a BW Printer for exposing black and white prints. Another new Bruning machine, the Model 153-M BW Developer is used for developing BW Prints exposed on the Model 2. Prints are delivered ready for use.

Cut Clamping Time
50%—OR MORE!



CARDINAL MACHINE COMPANY
SUNDALE CALIFORNIA

Cardinal SPEED VISE
Opens and closes full range instantly—locks and unlocks with half-turn

Cardinal Automatic AIR VISE
Synchronizes vise opening and closing with machine tool cycle—completely automatic.

WRITE FOR BULLETIN 8

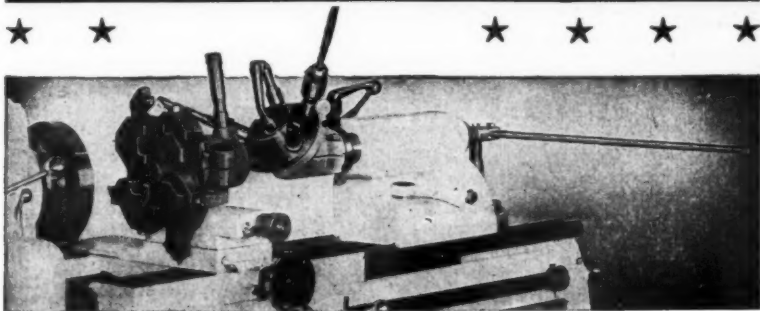
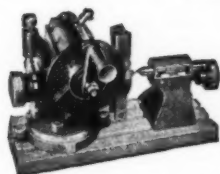
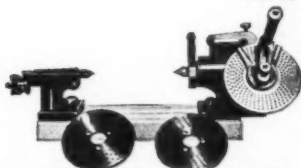


Photo above shows Jefferson Turrets on 16" lathe



7 1/2" Swivel Base Dividing Head — In Stock
IMMEDIATE DELIVERY
No Priority Required



PLAIN DIVIDING HEAD — complete with 3 Dividing Plates, 1—24 notch rapid Indexing Plate and Tailstock, Delivery 2 weeks.
7 1/2" Swivel Base Dividing Head and 6" Tilting Dividing Heads. Immediate Delivery.

Some territories still open for dealers and salesmen.

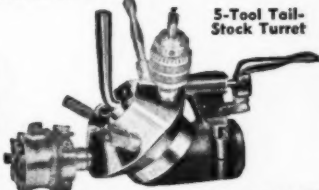
Convert YOUR ENGINE LATHE INTO A TURRET LATHE IN 15 SECONDS

Yes, it's as easy as that! You simply attach the Jefferson Tail-Stock Turret, the Jefferson Tool-Post Turret, and the Jefferson Adjustable Pull Feed to your lathes as shown in illustration.

The productive capacity of these machines will be more than doubled in many instances because there will be available at all times **NINE DIFFERENT TOOLS.**

With these three JEFFERSON time-saving devices attached to a lathe, any kind of work may be done, such as forming, roughing, boring, finishing, knurling, drilling, tapping, etc., without stopping the lathe, or changing tools. THE JEFFERSON TURRETS are made very substantial, rigid, accurate and in several sizes to fit small bench lathes up to 24" swing.

Jefferson Turrets are real production tools—substantial, rigid, accurate and adaptable to any size or make of engine lathes. They must not be confused with the small makeshift gadgets now on the market.



5-Tool Tail-Stock Turret

PAT. PENDING



4-Tool Tool-Post Turret

TURRET DELIVERIES IN 6 DAYS

JEFFERSON MACHINE TOOL CO.

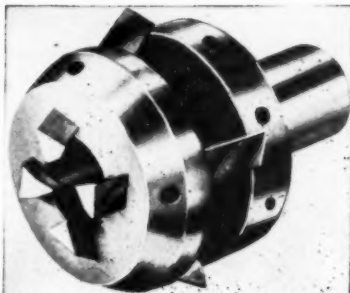
700 W. Fourth St., Cincinnati 3, Ohio

Tool-Post Turrets, Tail-Stock Turrets, Adjustable Pull Feeds, Belt Sanders, Gyrotory Foundry Riddles, Overhead Swing Frame Grinders, Milling Machines, Dividing Heads and Vises.

TRI-BIT HOLLOW MILLS

Tri-Bit cutter blades, manufactured by Weddell Tools, Inc., 1239 University Ave., Rochester 7, N. Y., are now applied to Hollow Mills.

The triangular tool bits fit into triangular shaped holes in a hollow mill cutter body, each locked and unlocked by a single lock screw. The blades are backed up and adjusted by single adjusting screws or all may be simultaneously adjusted by a single adjusting unit. There are no slots in the cutter body as cutter

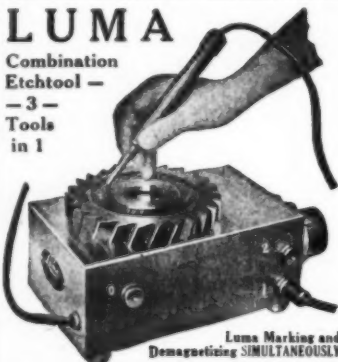


blades fit into holes which permit cutter body to be tied together all around the diameter, giving maximum strength in a minimum diameter. Furthermore, the natural triangular chip shape of the Tri-Bit gives generous chip clearance.

Tri-Bit Hollow Mills are furnished with standard blades of high speed steel, cast alloys or carbide tipped. They are made with solid shank, or shell type, or with special piloting bodies, or to incorporate drills or reamers.

LUMA

Combination
Etchtool —
— 3 —
Tools
in 1



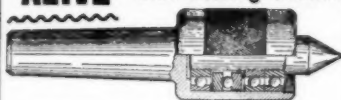
Luma Marking and
Demagnetizing SIMULTANEOUSLY

Writes on hardened steel — demagnetizes at the same time—with carbon point does light spot annealing and soldering jobs. Compact—easy to use—dependable.

Send for details—5-day FREE TRIAL OFFER!

Luma Electric Equipment Co.
Dept. H P. O. Box 132, Toledo 1, Ohio

"ALIVE" Ball Bearing Centers



"They turn with the work"

Write TODAY — and let us
tell you more about them.

MODERN MACHINE COMPANY
323 Berry Street BROOKLYN, N. Y.

McMAHON'S Magnetic Blocks

V-100 Magnetic Block

30-45-60° Angle, with Brass Separators, Brazed in place.
Size $2\frac{1}{2}$ " x $2\frac{1}{2}$ " x $3\frac{1}{2}$ " long. Priced \$35.00 each.

K-125 Magnetic Parallels

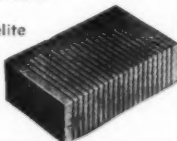
Sold in Sets of Two Blocks, with Bakelite Separators. Size, $1\frac{1}{2}$ " x $3\frac{1}{2}$ " x $2\frac{1}{4}$ " x 4"
long. Price, \$12.00 per Set.

Write for Descriptive Literature.

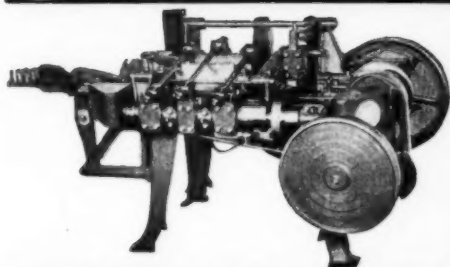
FRANK McMAHON COMPANY

142 S. JUNE ST.

DAYTON 3, OHIO



TO MEET TODAY'S INDUSTRIAL REQUIREMENTS



THE NILSON AUTOMATIC METAL AND WIRE FORMING MACHINE

The Nilson Automatic Metal and Wire Forming Machine meets today's industrial requirements. Here are some of the features of this machine: Open construction of press and forming tools. Patented slide feed with an independent cam-operated wire gripping device. Power operating wire feed is transmitted through a straight line.

Write today for information

The **A. H. NILSON** *Machine Co.*
BRIDGEPORT, CONN., U.S.A.

NICHOLSON *E-x-p-a-n-d-i-n-g* MANDRELS CUT COSTS *because THEY SAVE TIME AND PROMOTE PRECISION*

Set of 19 does the work of 193 solid arbors, for all bores from 1" to 7".



Type A is especially adapted for holding work with short bores while being machined between centers on lathes, grinders, millers, shapers, etc.



Type B is adapted for work with short and long bores. Hardened tool steel, accurately ground. Sold singly or in sets. Prompt delivery. Write for Bulletin 1043.

W. H. NICHOLSON & CO.
117 OREGON ST. WILKES-BARRE, PA.

TYPE A—STEP JAW DESIGN

Size No.	Range of Bore Taken	Length Overall
1A	1/2" to 1"	9"
2A	1" to 1 1/2"	11"
3A	1 1/2" to 2"	12 1/2"
4A	2" to 3"	20 1/2"
5A	3" to 4"	21"

TYPE B—STRAIGHT JAW DESIGN

Size No.	Range of Bore Taken	Length Overall
1X	1/2" to 1"	3"
2X	1" to 2 1/2"	6"
3X	2 1/2" to 3 1/2"	6"
00	3 1/2" to 7 1/2"	8 1/4"
0	1" to 1 1/2"	8 1/4"
1	1 1/2" to 2"	9"
2	1 1/2" to 2 1/2"	11 3/4"
3	2" to 2 1/2"	13 3/4"
4	2 1/2" to 3 1/2"	17 1/4"

(Other sizes taking up to 7" bores.)

TRADE SCHOOL EXPANDS



The DoAll Trade School, organized in July 1941, with a record of over 2,000 trainee placements, has moved from its former location in Minneapolis to new and larger quarters in Des Plaines, Ill., a suburb of Chicago.

The DoAll Company, sponsor of the school, realizing the importance of short-cut and material-saving methods in post-war production competition, has arranged to incorporate the company's Customer Test and Research Laboratories into the school's training program. At its new location, the school is housed in a large, modern plant, and, in addition to instruction covering operation, application, and maintenance of DoAll equipment, trainees

also receive valuable first-hand test data and setup experience, even before this information is released to the field. With over 74% of the total training time spent in practical shop work, the course has also been cut to a four-week training period.

Recently awarded the Army Air Force Certificate of Merit and certified by the Illinois State Department of Education, the DoAll Trade School is now pointing its program toward peace-time job training. The new four-week Contour Machining course places special stress on use of machine attachments and design of special production fixtures. Altho a slight charge will be made for this training

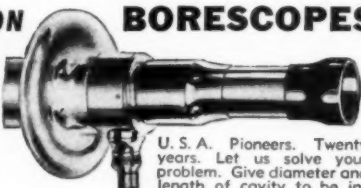
ILLUMINATED INSPECTION



LENOX Instruments explore the dark holes of industry—guns, turbine rotors, hollow shafts, tubes, tanks, well drill pipe, cartridge cases, etc.

LENOX INSTRUMENT COMPANY

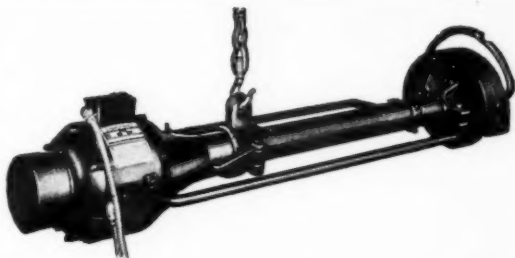
BORESCOPIES



U. S. A. Pioneers. Twenty years. Let us solve your problem. Give diameter and length of cavity to be inspected.

**2008 CHANCELLOR ST.
PHILADELPHIA 3, PA.**

THE MARSCHKE "IN-BETWEEN" SWING FRAME GRINDER

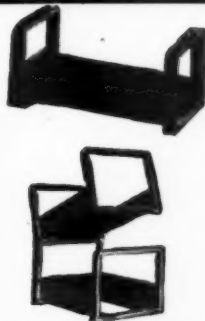
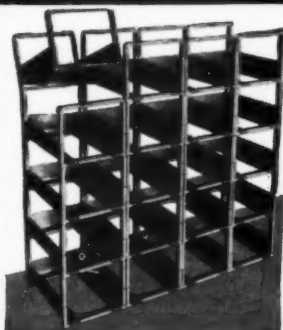


Here is a machine which is far more efficient for much of the work commonly done with portable electric hand tools, flexible shaft machines and chipping hammers.

The combination of balance and swivel collar suspension provides convenient maneuverability and the 3 HP motor, driving a 10" or 12" diameter wheel, develops a high standard of production. Furthermore, the construction and simplicity of design assures years of uninterrupted service under severest production demands.

You will like this machine and we will be pleased to tell you more about it. Write to,

VONNEGUT MOULDER CORP. 1805 MADISON AVENUE
INDIANAPOLIS 2, INDIANA



**UP-TO-DATE
STORAGE
of boxes of
Tools,
Parts,
Materials**

Every Box is instantly accessible when you use STACKRACKS. Heavy containers slide in and out like drawers—you can get at the contents of any one quickly and easily without disturbing the others. Patented STACKRACKS, to fit your boxes, interlock to form storage units of any size, shape or capacity.

Manufactured and sold in Canada exclusively
by Walter H. Wickware, Ottawa.

Write Stackbin Corp., 55 Troy St., Providence 1, R. I.

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STACKBIN

"Stacked and



SYSTEM

Still Accessible"

**Accurate Hole Transfer Made Easy With
NIELSEN TRANSFER SCREWS**



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

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NIELSEN TOOL &
DIE COMPANY**
1962 W. Eleven Mile Road,
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★ **CENTERLESS GRINDING**

Straight Cylindrical, Shoulder, Profile, and Multiple Diameters . . . Long Bar Grinding . . . Ground Taper Pins and Dowel Pins.

Screw machine products. Heat treated and ground if necessary. Improved and expanded facilities assure prompt and accurate service.
Send your blue prints or samples for estimates.

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**YOUR FIRST LINE OF
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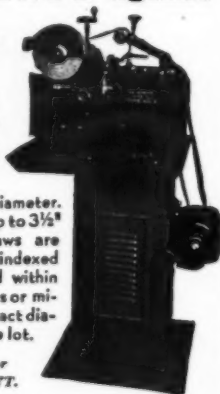
**HIGH
SHARPENING
COSTS**

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Automatically
Sharpens
Metal Saws
in gangs

up to 8" in diameter.
Takes gangs up to 3½"
thick. The saws are
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variation of plus or minus .001 of exact diameter of entire lot.

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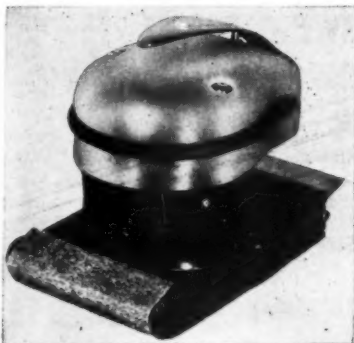


THE WARDWELL MFG. CO.
3165 Fulton Rd. Cleveland 9, Ohio

after Jan. 1, 1945, the instruction is presently offered without charge.

Applicants selected for placement as DoAll operators are picked according to past schooling or experience. Company-sponsored men are enrolled upon the sponsoring firm's request. Class schedules and general information can be had by writing to Director, DoAll Trade School, 254 North Laurel Ave., Des Plaines, Ill.

MITY-MIDGET SANDER



An interesting miniature sander has been developed by National Air Sander, Inc., 2712 West State St., Rockford, Ill. Tho small in size, it is formidable in performance. It is a high speed unit, powered by air, and an instant starting trigger fits the palm of the hand, giving unusually convenient control. Light and compact, it operates with little appreciable vibration so that it can be used continuously without fatigue. It weighs only 3½ lbs and conforms to the shape of the hand. It is well adapted for close fillet work, and can be used on small parts or large areas. The motor is sealed in a synthetic rubber housing. Operating on pre-lubricated ball-bearings, it needs no lubrication attention.

The makers point out that the sanding pad does not revolve, but it does move with a circular motion so that each abrasive grain scribes a 3/16" circle. At 5,000 cycles per minute, assuming 20,000 abrasive grains per square inch on No. 100 paper, it is obvious that this diminutive sander is a speedy performer. Air consumption is given as five cubic feet operating on 50 lbs air pressure. Abrasive strips (3"x8") are loaded quickly and easily. Bulletin giving full details is available on request.

Presenting
**A SUPER
DIAMOND WHEEL**

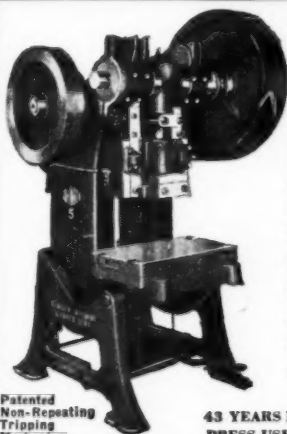
**CUTS MUCH FASTER — LASTS
MUCH LONGER**

**Diamond Tools & Wheels
To Your Specifications
SEND US YOUR PROBLEMS**



Free Engineering Service

DIAMOND WHEEL INDUSTRIES, INC.
57 E. JACKSON BLVD. CHICAGO 4, ILL.



**Patented
Non-Repeating
Tripping
Mechanism**

**UNLIMITED PEAK
PRODUCTION**

Much larger die space than average presses. Engineered and designed for unlimited peak production.

Reinforced construction at points of greatest wear.

If you want the best, send for illustrated catalog describing complete line TODAY.

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**43 YEARS ENGINEERING EXPERIENCE BUILT INTO EVERY JOHNSON
PRESS USED BY LEADING MFR'S. THROUGHOUT THE WORLD.**

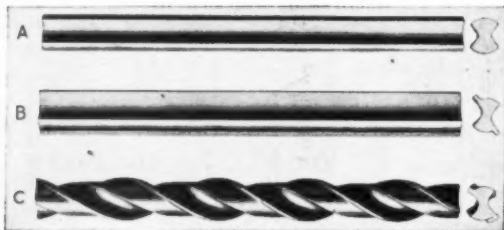
JOHNSON MACHINE AND PRESS CORP., ELKHART, INDIANA

REPUBLIC SHANKLESS DRILLS

A new "Shankless" High Speed Drill, was introduced to the metalworking industries at the recent Metal Congress in Cleveland.

sands of the new "Shankless" type drills in the last six years without the rest of the world hearing anything about it.

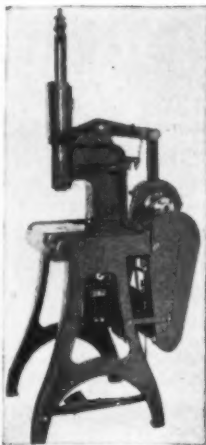
The makers of this new tool, the Republic Drill & Tool Co., 322 So. Green St., Chicago, describe it as "a new style



Illustrating the roll-forging and twisting operations in producing the new "Shankless" drills: — A—Grooved high speed steel as received from the steel mill; B—after roll-forging operation; C—After hot-twisting.

While the "Shankless" type Drill is new to the outside world, it is not new in the River Rouge plant of Ford Motor Co., where Raymond Rausch's new drill was perfected and adopted over six years ago. Ford Motor Co., is the only drill user in the country which makes twist drills for its own use. That explains why Ford has been able to use hundreds of thou-

High Speed Drill, with a continuous flute, produced by roll-forging and hot-twisting, and driven by a removable taper shank, known as a Drill Driver". The "Drill Driver", however, is not a new tool. In fact, Drill Drivers have been widely used for over 25 years, for driving the smaller sizes of conventional straight shank drills.



NO. 11A PRESS

SPRING PRESSES

No. 11A-1A. FLOOR TYPE

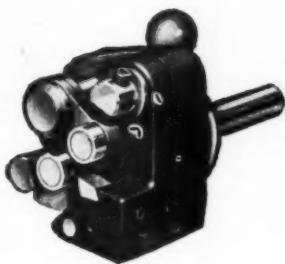
No. 00-0. BENCH TYPE

These machines are designed to deliver a quick, uniform blow repeatedly, regardless of variation in thickness of the work. They are used for riveting, staking, bending, forming, stamping and similar operations on light work.

Circulars Sent on Request.

REPRESENTED BY PRATT & WHITNEY

THE TAYLOR & FENN CO.
HARTFORD, CONN. U. S. A.



5/8"

**FOR FASTER STOCK REMOVAL,
UNIFORM SIZE AND SMOOTH
FINISH, you'll find NEUBERT BAR
TURNERS fill the bill.**

They are easy to set up, hold to size, and operate with heavy cuts and feeds and roll the work to a smooth, burnished finish.

Speed your production with NEUBERT BAR TURNERS.

Three sizes — 5/8", 1", 1 1/4" capacity.

Send for literature.

NEUBERT MACHINE COMPANY

Precision Cutting Tools

341¹/₂ W. Willow, Long Beach 6, Calif.



**NO BUCKING
-NO BREAKING
Check These
"Paddock Features"**

RECOMMENDED for old or new machines.

INTERCHANGEABLE BALL-BEARING WHEELS, running with the blade, balance wear.

INCREASES ABILITY to cut any kind of material.

MORE WORK in less time.

LOW COST — saves many dollars in blade breakage.

10 DAYS FREE TRIAL — write today.

PADDOCK TOOL COMPANY

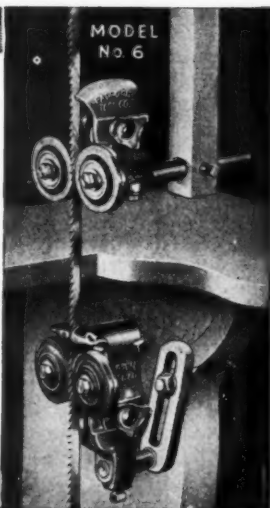
Guide Makers Since 1920

1418 Walnut Street

Kansas City 6, Missouri

Paddock
BALL-BEARING
BAND SAW GUIDES

Guided and Guarded by 6 Safety Points



GIRLS CAN OPERATE

NEW Rouse HAND MILLER FOR SMALL PARTS

\$98

(Without Fixtures)
F. O. B. Chicago
Motor Extra



One of the ROUSE Fixture Set-Ups that
Speed Production

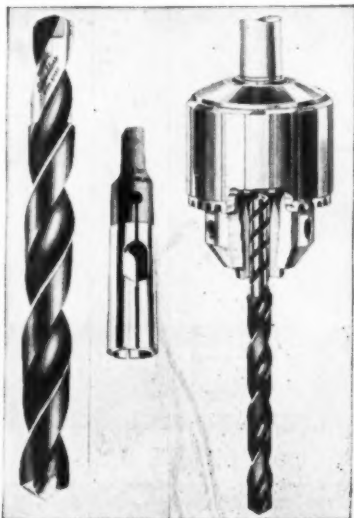
The Rouse Hand Miller is a versatile, efficient, high-speed ball bearing machine for handling light cuts in brass, aluminum and steel.

Rouse Fixture Set-Ups make the Rouse Hand Miller readily adaptable for accurately milling small parts for planes, radios, electric motors, and similar equipment. Spindle will take milling cutters or end mills.

Prompt delivery can be made.
Send for circular.

H. B. ROUSE & COMPANY
2214 N. Wayne Ave., Chicago 14, Illinois

Money-saving and operating advantages claimed for the new "Shankless" Drill include:



The new "Shankless" Drill and Drill Driver (left) and Method of gripping the new "All-Flute" Straight Shank Drill in a conventional chuck.

1—Because of the lower manufacturing costs of "Shankless" Drills, selling prices are considerably below those of Republic's conventional high speed taper shank drills.

2—The usable portion of the flutes of "Shankless" Drills is 25 to 40% greater than Republic's conventional High Speed Taper Shank Drills.

3—The "Shankless" Drill is tougher and stronger because it is roll-forged and because it has a heavier web than Republic's conventional drill.

4—The neck or driver end of the "Shankless" Drill is toughened, by proper heat treatment, so that it will "give" slightly under severe torsional strain. To this shock absorber action is attributed the reduced drill breakage on difficult drilling jobs.

5—The accuracy and concentricity of the "Shankless" Drill are equal to that of Republic's conventional taper shank drills.

MATTHEW Patented ROTARY TOOL CARRIER

is indispensable for finishing a complete multiple contour or irregular shaped milling job in ONE setting without use of Rotary table.

Capacity up to 7" diameter circle. Will fit any horizontal milling machine or can supply a suitable machine if required. Spindle speeds, standard 600 to 2800 R.P.M.

Rated capacity 1" end mills in steel.

Highly recommended for Metal Pattern, Molds of all kinds, Die Cast Dies, etc.

A quick self liquidating capital investment.

Descriptive matter on request.

PRODUCTION MACHINERY DEVELOPMENT COMPANY
4845 St. Aubin St., Detroit 7, Michigan



Use UNIQUE

TAPER ATTACHMENT

For 9" South Bend Workshop Lathes.
Models A, B and C, and 10" Logan Lathes.

- Built Husky To Stand The Gaff.
- Quick And Easy To Install.
- Cuts Taper up to 31-2" per foot.
- Cuts Taper up to 7" In Length.
- For Turning, Boring And Threading
All Kinds Of Taper Work.

Ask Your Dealer or Write Direct To
**UNIQUE MANUFACTURING
COMPANY**
1807 N. 31st AVE. OMAHA 11, NEBR.



SEND FOR CAT.
ALOGUE SHEETS
OF OUR COM-
PLETE LINE.

Bond
STOCK



GEARS

**SPROCKETS
SPEED
REDUCERS
FLEXIBLE
COUPLINGS**

**ARE LISTED IN OUR
NEW CATALOG
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BURKE

MILLING MACHINES
Make Fast Work of Small Jobs

Motor
Driven

Timken
roller or
ball bear-
ings to
spindle

Write today for
circulars.



Burke Machine Tool Co.
297 E. 16th St., Conneaut, Ohio

6—The life of one Drill Driver will equal that of a great many "Shankless" Drills because the Driver is a hardened and ground tool, made to withstand hard usage.

7—The new "Shankless" Drill is made in 135 sizes, from $\frac{1}{4}$ " to 2" diameter. Only seven sizes of Drill Drivers (No. 1 Morse Taper to No. 5 Morse Taper) are required for driving these 135 drill sizes.

That the first drill manufacturer to put these new drills on the market happens to be Republic Drill & Tool Co. is explained by the fact that Republic's Chief Engineer, Harry W. Delaney, is a Ford man. Prior to joining Republic in 1940, Delaney had spent 25 years with Ford Motor Co., and was in charge of Ford's River Rouge Drill Department at the time Raymond Rausch's "Shankless" type drill was perfected.

Scully-Jones & Co. of Chicago and J. C. Glenzer Co. of Detroit have announced that they will manufacture and sell, thru their established distributors, a complete line of Drill Drivers for Republic's new "Shankless" Drills.

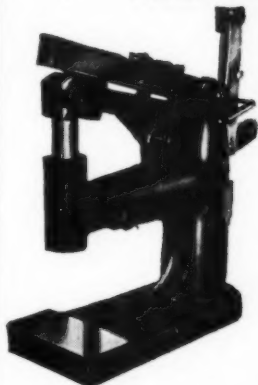
Along with the new "Shankless" Drill, Republic presents its new "All-Flute" High Speed Straight Shank Drill. This Drill is described as "the little brother of the Shankless Drill" because it is produced by the same roll-forging and hot-twisting processes as are used in making the "Shankless" Drill. The "All-Flute" Straight Shank Drill is offered in sizes, $\frac{1}{4}$ to $\frac{1}{2}$ " diameter and can be used in all standard drill chucks, without use of special holders of any kind. The Straight Shank end of the "All-Flute" Drill is produced by giving that end of the fluted section an extra twist which causes the spiral flutes to be compressed so the shank can be gripped firmly in any standard drill chuck.

SCHERR PUBLICATION

With its current issue No. 105, the George Scherr Co., 122 Lafayette St., New York 12, N. Y. has resumed regular publication of its house organ "Precise Production". This periodical will be issued regularly during the year to provide readers, interested in the advancement of precision, with news of the greatest accuracy.

For a copy of issue No. 105 covering Opti-Flats, the new glass surface plate, polished by optical methods and guaranteed accurate within 50 millionths of an inch, write the company.

AUTOMATIC STAKING MACHINE INCREASES PRODUCTION With Unskilled Manpower!



Outperforms conventional Riveters on numerous jobs.

A shortage of skilled workers won't upset your staking machine production if you use the Automatic Staking Machine which, even in unskilled hands, is fast, accurate and thoroughly dependable.

Uniform blow of hammer makes it ideal for riveting movable joints; can be quickly and easily adjusted for various jobs.

Available in Three Sizes

Stroke	1	1-B	2
Spindle	2"	2"	2 1/4"
Throat	1"	1"	1 1/4"
Depth	4 3/4"	4 3/4"	8 1/2"

Now's the Time to Write for Descriptive Material
and Prices.

WEBER MACHINE CORP.

59 Rutter Street

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WILLEYS

TUNGSTEN CARBIDE TOOLS

● Standard tools carried in stock for immediate delivery. Special tools built to your specifications.

Catalog gives full information on standard tools and blanks, as well special tools, gages, centers, centerless grinder rests and other special articles using Willey's Metal. Get your copy of Catalog 27 at once.

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CATALOG

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SOLE MAKERS OF WILLEY'S METAL

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Detroit 1, Michigan

"ROCKWELL" HARDNESS TESTER



Shipment in One Week of
These Enormously Improved
New Models.

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Concord Ave.
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WILSON

MECHANICAL INSTRUMENT CO., INC.,
An Associate Company of
American Chain & Cable Company, Inc.

YOST DRILL PRESS VISE



This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes.

Vise No.	Width of Jaw, inches	Opens, inches	Weight, Pounds
1D	3½	3½	12½
2D	5	5½	23

Do you need a vise of ANY type?

Write today for bulletins on
the extensive Yost line

YOST MFG. COMPANY
1335 SO. MAIN ST.
MEADVILLE, PENNSYLVANIA

TORQUE CONTROL COUPLINGS

Basing design and construction on the principle of controlled torque, Buffalo Machinery Co., Inc., 838 Grant St., Buffalo, N. Y. has introduced four distinctive types of Torque Control Couplings:—(1) Machine Tool Type; (2) Transmission Type; (3) Stud Driver, and (4) Nut Setter.

Developed as a unit—consisting of a driving end and a driven end, connected by an automatic clutch—cohesion between ends is maintained thru medium of a single disc in the smaller sizes and multiple discs in larger sizes.

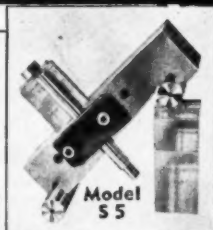
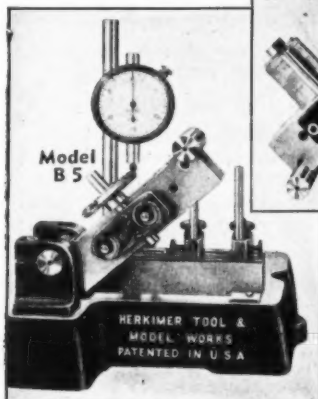


When set at a pre-determined torque to perform a particular operation, these Couplings transmit driving power thru them, but, when overloaded, they automatically throw out—severing the driving power thru the Coupling itself—automatically re-engaging and re-assuming driving power when overload has been removed.

Precision manufactured of high-grade steel and bronze, all bearing surfaces are carefully ground and fitted for long life. All working parts are lubricated thru the 2 ball-type oilers mounted on top shell of Coupling.

The Machine Tool Type—available in seven sizes—has been designed for all

Simplified BEVEL GEAR GAUGING



No Difficult Operations,
Involved Calculations or
Intricate Manipulations.

With one set-up on these
tools, any operator with ordi-
nary gauging experience and
a knowledge of blue print
reading, can perform these

three important operations:

1. Check dimensional accuracy of the addendum cone (gear face) as related to thrust face of hub.
2. Check accuracy of cone angle.
3. Check run-out of gear face.

Write for descriptive folder.

HERKIMER TOOL & MODEL WORKS, 1010 George St., Herkimer, N. Y.



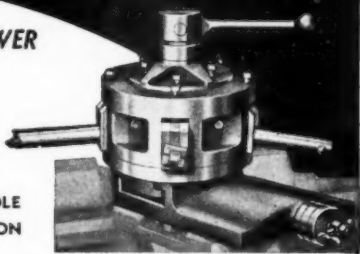
WANT TO SAVE TIME?

HERE IS THE ANSWER

Our **NEW IMPROVED
5 STATION LATHE TURRETS**

- 1 JUST A TURN AND A LIFT OF THE HANDLE
BRINGS ONE OF FIVE TOOLS IN POSITION
- 2 THIS, WITH TEN ACCURATE INDEXED TOOL
POSITIONS ALLOWED MINUTE ADJUSTMENTS

MADE UP IN FOUR
INDIVIDUAL SIZES—
FOR LATHES FROM
9" to 30" SWING



Time saved brings VICTORY that much nearer. Our NEW IMPROVED TURRET HEADS are built to take heavy cuts, and give precision service. Inexperienced help can quickly become fast operators with these NEW IMPROVED TURRET HEADS.



Write Today for
Complete Details

132 CHARLES STREET,

AUBURNDAL, MASS.

drilling, reaming and tapping operations on drilling machines, lathes, turret lathes and horizontal boring mills and will accommodate drilling operations from wire drills up to 2½". Five of these sizes are furnished either with knurled adjusting ring for operations requiring a quick method of changing torque setting, or with two adjusting screws for production operations on which torque remains constant, while the two largest sizes are furnished with the two adjusting screws only.

The Stud Driver is a combination unit comprising Machine Tool Type and an automatic self-releasing holder for the stud. When stud has been driven to its exact setting, Coupling automatically releases, at which time operator reverses spindle of the operating tool and stud holder backs off without unscrewing stud. Available in three sizes for studs up to 3".

The Transmission Type has been designed for shaft applications. Automatically severing driving power when overloaded and staying disengaged until power is shut off or source of overload corrected, it is an automatic safeguard between prime mover and driven unit. Due to the non-spark feature, it is suitable for applications in Granaries, Mills, Re-

fineries, Mines and Chemical Plants. Available in five sizes from ½ to 50 hp.

The Nut Setter is used in conjunction with the Machine Tool Type. Consisting of an adaptor shank to fit that unit, it is available in four sizes for setting nuts from 3/16 to 2¾".

Descriptive Bulletin No. 1005 is available.

BACK THE FIGHTING MEN WITH FIGHTING DOLLARS — SIXTH WAR LOAN BONDS!

OHIO DREADNAUGHT MACHINES

Recently published by the Ohio Machine Tool Co., Kenton, Ohio, is a 24-page bulletin 1000 on their Dreadnaught horizontal boring, drilling and milling machines. A few pages are devoted to the history and accomplishments of the company since it was established in 1887. Considerable space is given to descriptions and specifications of all their equipment and it is completed with numerous illustrations of typical applications. The bulletin is available upon request to the company.



HEDSTROM



OSCAR W. HEDSTROM CORP. 4830 West Division St., Phone Columbus 3667, Chicago, 51, Ill.

"OH-38" will help you do it in 1945

Sustained post-war employment means large volume production of better products at reasonable prices—that's the story.

• Many component parts of your post-war products can be made better, faster, cheaper —with OH-38.

OH-38 Aluminum Alloy—Non-Heat Treated—an exclusive product of Hedstrom—is a perfected metal with proven superiority in a wide range of machining operations. Utilized in hundreds of war items, many of intricate construction, as well as permissible civilian products, OH-38 has an unbroken record of success in meeting the most difficult requirements.

Easily machinable—easy on tools—increases tooling accuracy—holds threads without stripping. Non-corrosive—non-oxidizing—non-magnetic—spark-proof—does not require heat treatment—will not expand or contract. Tensile strength: 35,000 to 40,000 lbs. per sq. in.

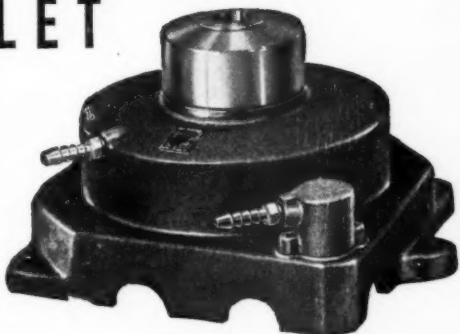
OH-38 is used only in castings by Hedstrom. Our Pattern Service will supply complete models of parts for your new products... Send for technical information.

Announcing **MEAD**

AIR COLLET FIXTURES

These new high production precision fixtures open up new vistas in the field of second operation work. Their accuracy will meet the most rigid requirements; their fast action leaves nothing to be desired; their compactness does not waste a fractional inch. They will hold a 1" bar so firmly that a strong man cannot turn it with a 12" pipe wrench, yet in conjunction with a suitable pressure reducer they will gently handle the most delicate of precision parts as low as 1/16" in diameter. Automatic ejection of finished work.

Write for new Mead Air Power Catalog.



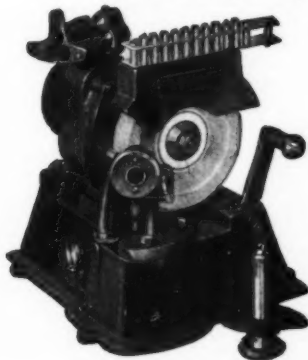
MEAD SPECIALTIES COMPANY

15 South Market Street

Dept. 124-YA

CHICAGO 6, U. S. A.

POST-WAR PRODUCTION OF CIVILIAN PRODUCTS WILL REQUIRE QUANTITIES OF SMALL SHARP DRILLS. KEEP 'EM SHARP WITH A



BLACK DIAMOND DRILL GRINDER

ONE Black Diamond Drill Grinder, in any manufacturing Plant, will meet all production demands for accurately ground Small Gauge and Fractional Drills.

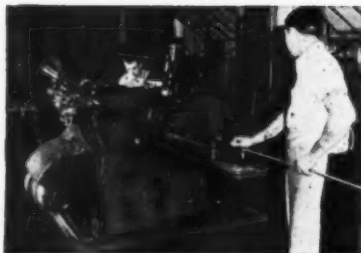
On this machine, any apprentice becomes a skilled operator . . . produces quantities of sharp drills, ground to perfection . . . with lips of uniform length . . . correct angle . . . proper clearance for accurate drilling.

Black Diamond Grinders cut grinding costs at least 50% . . . save expensive drills . . . reduce breakage . . . release skilled labor for more important work . . . quickly pay for themselves . . . and the Web Thinning attachment efficiently cares for Notched, Colton, or Crank Shaft Points.

If you use small drills, singly or in gangs—you can speed production and save valuable time with a Black Diamond Grinder on the job.

Write for full details.

BLACK DIAMOND SAW & MACHINE WORKS, INC.
45 NORTH AVENUE NATICK, MASSACHUSETTS



ACCURATE TUBING STARTS HERE

Dangerous errors in instrument readings can be caused by irregularities on the inside surface of tubing. Ace precision ground steel mandrels help keep this surface accurate in all kinds of glass, fibre, rubber, and plastic tubes.

RELY ON ACE FOR PRECISION GRINDING Centerless, Internal Cylindrical, External Cylindrical, Blanchard Surface, Plain Surface, and Thread Grinding.

PRODUCTION MACHINING Turning, milling, drilling, cutting, tapping, and threading of small machine parts that require precision grinding—on a mass-production basis.

METAL STAMPING Blanking, forming, and extruding of small metal parts on presses up to 75-ton capacity. Spot welding, sub-assemblies and assembly of intricate radio and machine parts.

HEAT TREATING Electric and gas furnaces, individually pyrometer controlled, for high-heat, quenching, and carburizing of parts up to approximately 10" x 10" x 15".

TOOL AND DIE WORK All operations for the production of Punches and Dies for small stampings, for Jigs, Fixtures, Gages, Moulds, Form Blocks, Tool Bits and Circular Form Cutters.

Send Blue Print, Sketch, or Sample to



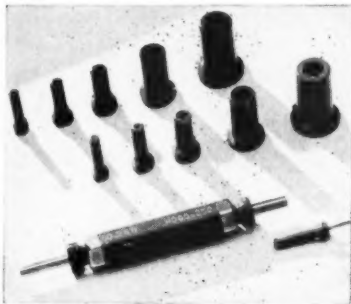
ACE MANUFACTURING CORPORATION
for Precision Parts



1251 E. ERIE AVENUE, PHILADELPHIA 24, PA.

TENITE PLASTIC COLLETS

Black and red collets of Tenite plastic, tapered and slotted to fit standard plug gage handles, increase the life of gaging surfaces. Use of Tenite for these collets prevents scratching or burring of gaging surfaces; thus, most of the gage's length can be used. As the "go" and "no go" ends are worn beyond allowed tolerances, they are simply cut off, and an unused end is ready for gaging. Red collets make for quick identification of the "not go" members.



To facilitate resetting, shoulder of collet is notched for an end wrench, and a thin slot the length of collet takes up slack in the locked position. Two shallow flat surfaces on taper provide for dimensional adjustment under pressure.

Handles of these gages are also made of Tenite. They are thus much lighter in weight than steel gages and enable inspectors to make quicker, more accurate inspections.

Collets are turned from rod stock and marketed by Turner Gauge Grinding Co., Ferndale, Mich. The plastic rod is extruded by Detroit Macoid Corp., Detroit; handles are molded by Federal Tool Corp., Chicago. Tenite is a product of Tennessee Eastman Corp., Knoxville, Tenn.

FEDERAL MICRO-COMPARATOR

A combination micrometer and dial indicator comparator designed for production inspection and tool-room use is offered by the Federal Products Corporation, 1144 Eddy St., Providence 1, R. I.

The unusual versatility of this instrument makes it especially useful in tool-

**Will Not Mar
Metal or Plated
Finishes —**

The New
**PYRALIN
TIPPED
MALLET**

**The SOUTHWEST
MALLET**—a nec-
essity in every tool
chest.

**SEND \$1.00 FOR
POSTPAID SAM-
PLE MALLET.**

**Place your orders
now for immediate
delivery.**



The only Pyralin Mallet on the market with threaded tips re-
placeable by hand. Plastic tips are quickly and easily screwed
into the solid "non-sparking, non-magnetic alloy heads" when
replacements become necessary.

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SANTA ANA, CALIF.

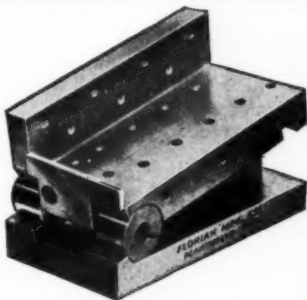
Sine

**ANGLE
PLATE**

**FOR EXTREME
ACCURACY**

Nothing complicated in checking or grind-
ing accurate angles from 0 to 90 deg. Use
gage blocks, a table of sines and the simple
formula $\text{sine } x \times 4 + 0.300 \text{ deg.}$ Any angle
may be obtained . . . and positively main-
tained . . . with locking screws operating
through split bearing.

This precision instrument is a complete unit
of plate and base . . . hardened and



ground, built for continued use . . .
packed in neat, serviceable case.
Details on request.

Manufactured by FLORIAN MFG. CO., Plantsville, Conn.

DISTRIBUTED BY

AMERICAN STANDARD CO.

Southington, Conn.

rooms and small shops that have to gage miscellaneous job lots of duplicate pieces. The dial indicator comparator can be employed for gaging work at a fast rate, and is claimed to give uniform readings even when used by different operators.

The micrometer head reading directly to 0.0001" on the thimble eliminates need of a complete set of gage-blocks for setting dial indicator to the required dimension. The 1"- and 2"- gage-blocks furnished as extra equipment permit setting gage by means of the micrometer to any dimension within the measuring range.

NEW LOW COST DRILL GRINDER

Anyone can do expert drill grinding with this simple-to-use drill grinding attachment—fits on any bench grinder—saves buying new twist drills—saves time



and materials that dull bits waste. Grinds bits from 3/16 to 1 1/4. Write for FREE literature.

T & H Mfg. Co.
811 E. 31 St.
Kansas City, Mo

WORN GAGES

NEED BUILDING UP!

WITH **DURO-CHROME***

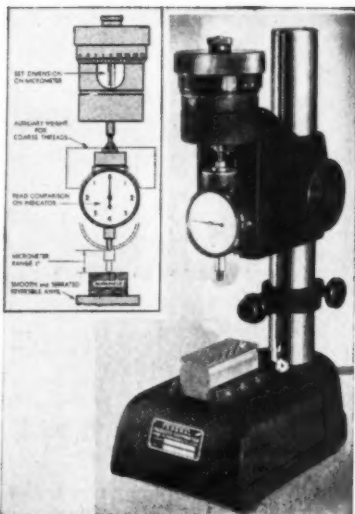
"HARD CHROME TREATMENT"

DON'T SCRAP WORN GAGES!
Hard-surface and build them up with super-hard **DURO-CHROME**, before it's too late! **SAVE** worn or over-machined **PARTS** the same way.

SEND FOR BOOKLET 557 WAYS DURO-CHROME SAVES MONEY

America's pioneer Industrial Chrome Treatment Plant treats machine parts and tools, day and night, for Chicago area's great War Plants.

SEELEY 8262 DURO-CHROME 25 S. HOYNE AVE. CHICAGO 12, ILL.
OF CHICAGO, INC.



The micrometer head facilitates inspection of thread pitch diameters by the three-wire method. An auxiliary weight provides the additional pressure required for the coarser threads. This weight and a chisel-shaped sensitive contact anvil are furnished as extras. A Federal super-sensitive low-friction dial indicator having 0.0001" graduations and high repetitive accuracy is furnished as regular equipment.

The instrument is also used for direct measuring with a constant contact pressure by setting dial indicator at zero and using that as a reference point. The sensitive contact diamond point is 3/16" in diameter and has 3/32" contact radius. Boron-carbide contacts can also be furnished if desired. The maximum vertical capacity measured from the sensitive contact point to the reference anvil is 8", and the maximum throat depth 3 3/4". The reference anvil has a reversible, ground and lapped surface 3-3/16 by 1 1/2". Instrument has a base 6 1/2 by 10", is 18" high, and weighs about 62 pounds.



FOOT CONTROL SWITCH

**STREAMLINED
4-SPEED
REAMER
DRIVER**

Complete with motor . . . 4" four-jaw universal machine tool chuck and foot control switch. Capacity from $\frac{1}{4}$ " to $1\frac{1}{2}$ " reamers. Four speeds . . . 30—45—72 and 115 RPM. Higher speed ranges available. Eliminates handwork. Speeds production. Mail your order today. The new Greaves streamlined reamer-driver will come your way— pronto!

THE Greaves MACHINE TOOL CO.
2013-1 R.D. Eastern Ave.
Cincinnati, Ohio

"OLIVER"

18 - INCH METAL CUTTING BAND SAW

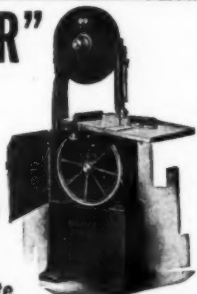
Most Complete Portable Band Saw on the Market

This versatile saw is especially effective in sawing sheet steel ($\frac{1}{8}$ " and under) and other sheet metals, small rods and all kinds of tubing. Also sprues of soft metal, hard rubber, composition, wood, etc. Cuts circles, irregular curves and straight.

This unit takes work 18" between saw and column and 9" high under upper guide. Can use saws up to $\frac{1}{2}$ " wide. By using gauges will cut parallel up to $1\frac{1}{2}$ " wide and will cut off and miter up to $6\frac{1}{2}$ ". Table tilts 45 degrees to the right. Every detail in precision built.

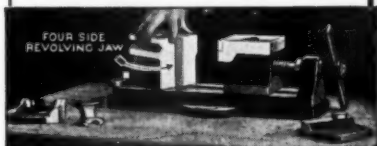
Write for descriptive folder.

OLIVER MACHINERY COMPANY
GRAND RAPIDS, MICHIGAN, U. S. A.



A TIME SAVER

YOU CAN EFFECT A SAVING OF 30 MINUTES TO SEVERAL HOURS on each job your machinists rig up on the Drill Press, Miller, etc. It does this by eliminating the necessity of hunting for Bolts, Clamps, Angle Plates, Parallel Strips, etc., customarily used for holding the work. The JACKSON TIME-SAVING VISE effects this by means of its revolving Turret Jaw and Supplementary Jaws which enable it to hold almost instantly the thousand and one shapes that arise in manufacturing and repair work. No other vise is like the Jackson in design or accomplishment and the economies it effects will return its first cost to you in a few weeks of steady work.



Send for Bulletin No. 23-B
Describing the
JACKSON TIME-SAVING VISE

BROWN ENGINEERING CO.

126 N. THIRD ST. READING, PA.

TRECKER HEADS N.M.T.B.A.

Joseph L. Trecker, Vice president, Kearney & Trecker Corp., Milwaukee, Wis., was elected President of the National Machine Tool Builders' at the Association's annual meeting at Hot Springs, Va. Hotel.

William P. Kirk, Vice President, Pratt & Whitney Division, Niles Bement Pond Co., West Hartford, Conn., was elected First Vice President; Herbert H. Pease, President, New Britain Gridley Machine

NEW TOOL GRINDER

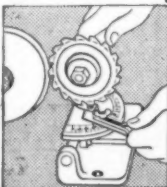
Grinds Milling Wheels, Slitting saws, Lathe Tools, Wood Turning Chisels, Many Small Tools to any Degree or Angle.

Write for Literature.

T. & H. MFG. CO.

811-3 East 31st

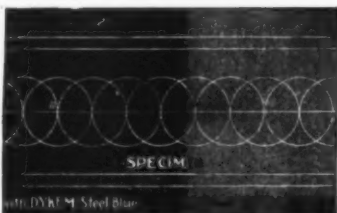
Kansas City 3, Mo.



Division, the New Britain Machine Co., New Britain, Conn., was elected Second Vice President; and Crawford N. Kirkpatrick, President, Landis Machine Co., Waynesboro, Pa., was elected Treasurer.

Newly elected Directors are Mr. Pease, A. M. Johnson, President, Barnes Drill Co., Rockford, Ill., and H. W. Brockhoff, President, National Automatic Tool Co., Richmond, Ind.

Discussing the postwar outlook, Trecker, newly elected President, said that because machine tools are a major factor in cutting production costs and increasing productivity, the machine tool industry



DYKEM STEEL BLUE STOPS LOSSES making dies & templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information.

THE DYKEM COMPANY

2301G N. 11th St.,

St. Louis, Mo.

(In Canada: 444 Pacific Ave., Toronto, Ont.)

Gusher COOLANT PUMPS

Write for
descriptive
literature

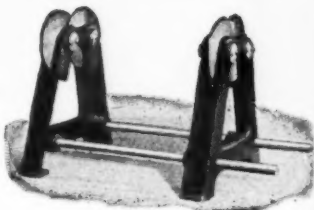
Made in various types and sizes from 1/30 to 2 H.P. Pumping capacity up to 200 g. p. m. Many patented and exclusive features.

THE RUTHMAN MACHINERY CO.
1808 Reading Rd. Cincinnati, Ohio

BALANCING WAYS

Shops handling rotating parts find this simple, sturdy and thoroughly dependable device highly efficient for balancing and truing operations. It assures better work . . . saves time . . . saves labor.

Four chilled iron discs rotate with minimum friction on sensitive special bearings, giving a quick, accurate indication of whether or not the work is in perfect balance.



Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000

Write for
BULLETIN 125

ANDERSON BROS. MFG. CO.

Anderson

ROCKFORD, ILL. U.S.A.

Buy More
BONDS

Prompt Delivery
on Thread Plug
Gauges

WHEN WE
TURN THE
PAGE,
MASTER
GAUGE WILL
BE READY with



GAUGES DIES JIGS FIXTURES

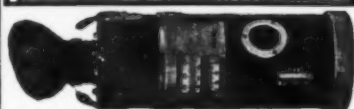
MASTER GAUGE CO.

2210 FENKELL AVE.

Phone: University 3-7676

DETROIT 21, MICH.

PYRO THE SIMPLIFIED OPTICAL PYROMETER



Unique construction enables operators to rapidly determine temperature even on minute spots, fast moving objects or the smallest streams; no correction charts, no accessories, no upkeep.

THE PYROMETER INSTRUMENT CO.
102-105 Lafayette St., New York, N. Y.

SEND US YOUR PRINTS FOR *Quotations*

THREAD GRINDING

Also Internal, External
and surface grinding.

BROACHING

SCREW MACHINE PRODUCTS

MAGNETIC INSPECTION

• GEARS •

SPUR
BEVEL

WORM
HELICAL



TAYLOR
MACHINE COMPANY

MANUFACTURERS OF
AVIATION & AUTOMOTIVE PARTS

★ *Gear Specialists*

1917 EAST 8TH ST. • CLEVELAND 3, OHIO

is the key to the whole postwar economy of the U. S.

"Manufacturers who sell products and merchandise to the public," Trecker said, "must get their prices down low enough to assure continued large-scale buying. If the nation can be successful enough in making more goods for more people at lower prices, I believe that the country has a good chance of reaching the postwar volume of 150 billion dollars required, according to the Committee for Economic Development and other estimates to maintain high-level employment."

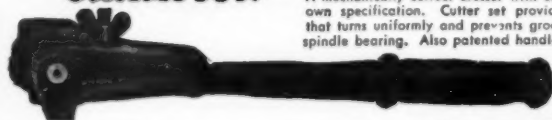
DURAL BULLETIN

With the prospect of aluminum becoming available in large quantities in the near future, many manufacturers are studying how this material of manifold uses can be applied to their current and postwar products. Just off the press is a timely booklet entitled "Dural Parts", which should be read by all forward-thinking design engineers and production men.

Profusely illustrated, the booklet shows a wide variety of screw machine parts, and also portrays many different types of dural fittings used in aircraft production. Shown, too, are Army Air Force Series hydraulic fittings, the Army, Navy Series, etc. In back of booklet are aluminum weight conversion tables, and tables showing approximate stock required to make 1,000 pieces, etc. Also discussed are techniques for production of aluminum machined parts from extrusions of high strength alloys suitable for aircraft and industrial uses.

The booklet is representative of this company which has been widely known for 30 years for its advanced methods in mechanical engineering, designing, and the production of special, automatic machinery. Write on your letterhead for complimentary copy to Harvey Machine Co., Inc., 6200 Avalon Blvd., Los Angeles (3) Cal.

EVERY ONE A "CHAMPION"
CHAMPION



EMERY WHEEL DRESSER

A mechanically correct dresser with cutters made of steel of our own specification. Cutter set provided with revolving sleeve that turns uniformly and prevents grooving of spindle. Patented spindle bearing. Also patented handle cap that serves as bearing clamp, eliminates set screws and eliminates moving parts that wear.

The Champion Dresser will outwear many cheaper dressers... a fact proved for years by thousands of shops.

THE WESTERN TOOL
and Manufacturing Co.
SUNNYVALE, CALIF.

Train Your Men This New, Easy Way with **HOW TO OPERATE A LATHE**

By John T. Shuman
Coordinator, Williamsport
Technical Institute
and Lewis H. Bardo
Instructor in Toolmaking,
Williamsport Technical
Institute



Gives new and semi-skilled operators the information they need. Presented in simple, easy-to-grasp question and answer form. Ideal for shop training programs. Complete with tables, charts, worked-out examples, decimal equivalents, diagrams. Profusely illustrated with clear photographs of machinery parts and tools.

161 Pages 143 Illustrations \$1.75

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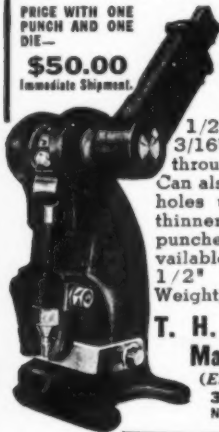
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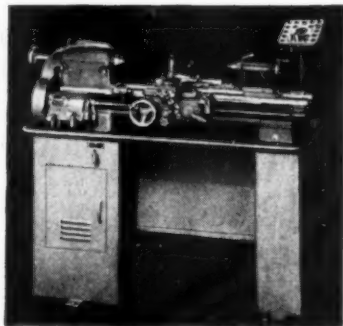
Capacity —
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3/16" steel; 13/32"
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Can also be made for
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9-INCH TOOLROOM LATHE

A new 9" Toolroom Lathe for exacting toolroom or production operations is announced by South Bend. It has a 9 1/4" swing and takes 22" between centers. It has a maximum collet capacity of 1/2" and a 3/4" spindle bore.



The 12-spindle speeds range from 41 to 1270 rpm with back-gear drive for the lower speeds. A quick change gear box permits cutting 48 pitches of screw threads, 4 to 224 per inch; and provides 48 power longitudinal feeds and power cross-feeds. The lathe is equipped with a handwheel draw-in collet attachment, collet rack, taper attachment, thread dial indicator, thread cutting stop, large and small face plates, and micrometer carriage stop. Additional attachments are available which simplify machining of special classes of work.

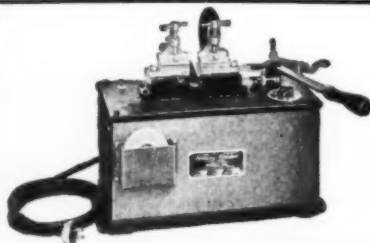
Complete information on this lathe can be obtained by writing to South Bend Lathe Works, 384 E. Madison St., South Bend 22, Ind.

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The No. 141 Bench Type Metal Working Band Saw Welder is available with or without grinder. Work can be annealed without removing from the Welder. Band saws up to 3/4" wide may be welded. 220 and 110 Volt, 60 Cycle, single phase, 5 point heat control, 1 point anneal heat. Shipping weight 79 lbs. Let us send you further details.

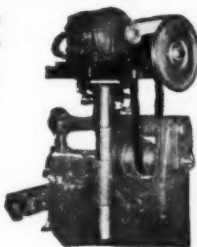
Mfrs. of complete line of Spot, Butt, Seam, Flash, Projection and Special Welders.

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Save floor space, save power, and eliminate line shaft expense by installing MODERN MOTOR DRIVES in your plant. All drives are ball-bearing equipped and designed to fit practically every machine tool. Soundly engineered for long life.

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NICHOLS ENGINEERING CO.
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Sizes 1/2" to 4" Pipe

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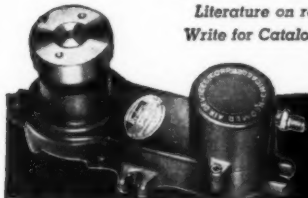
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Accurately holds the depth at the same time it automatically centers parts for drilling, milling, tapping, etc. Needed in every plant where second operation work is done. Also for assembly or wherever a holding fixture to do precision operations is needed. Uses Brown and Sharpe type screw machine collets and simplifies "setting-up" operations and in most instances eliminates the making of jigs or fixtures.

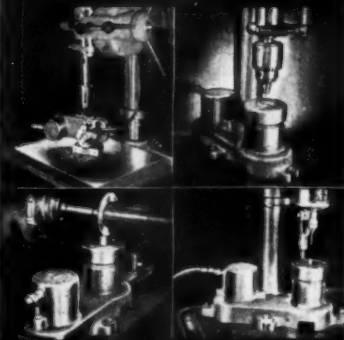
Has low consumption of air and its simplicity of construction eliminates expensive repairs.

Four models—No. 00—No. 0—No. 2 and No. 2 Special. Collet capacity from 1/16" to 1 3/4".

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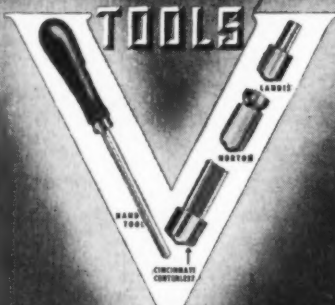
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Fast, Accurate
Metal-Cutting
Use
KENNAMETAL CEMENTED
TOOLS, BLANKS, and MILLING CUTTERS CARBIDE




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Diamond Wheel Dressing
TOOLS

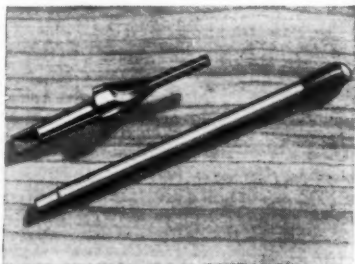


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13 YEARS EXPERIENCE **DIAMOND COMPANY - NEW YORK**
INDUSTRIAL DIAMONDS AND DIAMOND PRODUCTS
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GAY-LEE TOOLS

Gay-Lee announces a complete line of cutting tools, form ground with cam relief. Featured in the line are standard gear tooth pointers and special tools ranging in size from 1½" in diameter down to the exceedingly small special reamer shown next to a matchstick in the illustration.

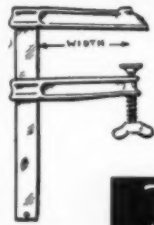


Gay-Lee specializes in gear rounding and chamfering cutters and clutch tooth milling cutters, precision-made to exceptionally close tolerances. All operations are performed by highly-trained craftsmen using modern tools and fixtures—many specially designed by Gay-Lee engineers. It is this feature of specialization in "know how" and equipment that, according to the manufacturer, gives Gay-Lee tools a premium value in long wear, high output, and work quality.

Gay-Lee also produces special ground form relieved cutting tools to customers' specifications. In addition, their services are available in the solution of gear shifting problems.

Information on Gay-Lee products and services is contained in a free, illustrated circular available from Gay-Lee Co., 117 East Hazelhurst, Ferndale 20, Mich.

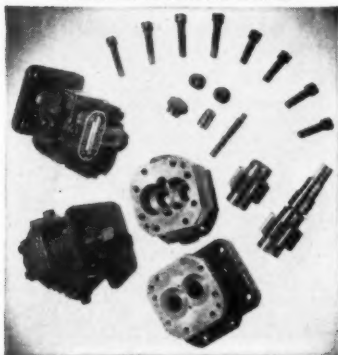
QUICK ACTION CLAMPS



A complete line of five widths: 2" to 7".
An unlimited variety of lengths.
Sturdy — Handy — Durable.
High grade Steel and Malleable Iron.
Acme Thread Spindle.
For Welding jobs: Special type with spatter-proof spindles.

THE WETZLER CLAMP CO.
43-15-11TH STREET, LONG ISLAND CITY 1, N. Y.

BARNES ROTARY PUMP



A new, low pressure, rotary pump, designed for industrial application and affording an efficient and economical method for pumping all types of liquids having lubricating qualities, has been announced by the John S. Barnes Corp., Rockford, Ill.

The new Barnes pump is adapted for use as a lubricating booster pump for

oil lines, a gasoline dispensing pump and for oil pressure systems on automotive, truck or tractor equipment. It is also suitable for use on Torque Converters. Capacity ranges proportionately from one gallon per minute at 600 rpm to four gpm at 2400 rpm. It has a high volumetric efficiency, pumping extremely low viscosity fluids.

An outstanding feature is the Barnes patented spur gear tooth form. It is claimed that the tooth construction completely eliminates excessive sliding, and reduces slippage of fluid to an absolute minimum; each tooth completely fills the mating space, as gears mesh, and perfect sealing action is effected. Thus positive displacement of fluid is assured despite variation in fluid viscosity or other factors.

Protection against excessive pressures is afforded by a relief valve, adjusted and set at factory under operating conditions simulating those of the plant in which pump is to be installed. Complete balance is effected by equalized fluid pressure thruout the pump. The pump can be supplied with or without relief valve.

Maximum pressure range is 200 pounds psi and tests show that vacuum to 26" mercury gauge is feasible.

Further information is available from the manufacturer in booklet form.

MODEL No. 16 "SPECIAL"

CONSTRUCTED AS PER SPECIFICATIONS OF U. S. NAVAL AIRCRAFT FACTORIES

BUTTERFLY FILING and SAWING MACHINE

(Die Making Machine)

This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just as well. This type of machine is usually adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and precision filing and sawing is desired. We also manufacture smaller models—Model D-10" Table; Model E.L. 12" Table.

HARVEY MFG. CORP.

161 GRAND ST., NEW YORK

Phone Canal 6-5170



BEWARE OF IMITATIONS!

Our machine carries the Butterfly trade mark.

Registered U. S. Patent Office

DEGREASING PRACTICES

A 10-page booklet of standard practices for degreasing metals or other non-porous materials with chlorinated solvents has been released.

Distributed free upon request, it has been prepared by the Solvents Division of the Electrochemicals Dept., of the E. I. du Pont de Nemours Co., Wilmington (98) Del., in consultation with G. S. Blakeslee & Co., Chicago, and Detrex Corp., Detroit, manufacturers of degreasing equipment.

A number of typical degreasing machines are illustrated.

Vapor degreasing is used for cleaning metal parts of all kinds prior to inspection or assembly, or in preparation for subsequent processing or finishing operations such as rustproofing, painting, electroplating, anodizing and galvanizing. Glass and plastics are also frequently cleaned by this method. The essential part of the process is suspension of the material in vapors of trichlorethylene, or sometimes perchlorethylene, so that the pure, condensed, liquid solvent rinses parts free of grease and oil.

The booklet outlines fundamentals of

machine design, installation and operation which must be considered to insure safety and efficiency, and gives a list of literature references.

H. S. S. ELECTRODES

The American Manganese Steel Div. of American Brake Shoe Co., Chicago Heights, Ill., manufacturers of Conservation Welding Materials", announces a new welding rod known as Amsco Tool-Face.

This new high carbon, high chromium, molybdenum, tungsten and vanadium bearing welding rod is commonly known as high speed steel. Its present uses are manufacturing composite cutting tools such as for lathes, shapers, etc. It is also used in manufacturing composite forging dies, rock drill bits, and for salvaging his tool steel parts that become broken or worn by impact and abrasion. It has a guaranteed Brinell hardness of between 575 and 675.

It can also be used as a general hard-surfacing rod where extreme hardness and resistance to shock is of primary importance.

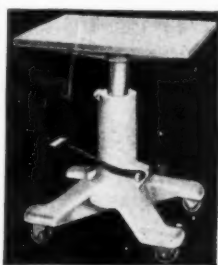
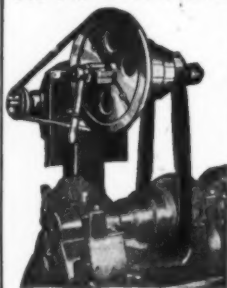
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Eliminate heavy lifting. Cut handling costs. Table

swivels and locks in any position. Can be varied 15½" by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

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DOUBLE YOUR DRILL PRESS CAPACITY

Minutes are Seconds with the new TWISTITE Vises. Open to full capacity in one second. Speed Defense Production with these New Vises.



J. A. RICHARDS CO., Kalamazoo, Mich.

We also

MULTIFORM

Bender-Cutters for producing brackets and fixtures from flat wire, etc.

MULTIFORM PRODUCTS

Ask about our machines and service.



Louis Polk, (right), President, the Sheffield Corp., demonstrated a new high amplification Precisionaire instrument to Charles F. Kettering, Vice-President of General Motors and General Manager of its Research Division, and Walter H. J. Behm, president of the Winters National Bank & Trust Co., Dayton, during their recent visit to Sheffield.

DIAMOND TOOLS

Diamonds vary in quality and it is important to use the proper kind for a given job. "Bargain diamonds" are not an economy.

If you don't know diamonds know your diamond dealer. Our 45 years in this field merits your confidence.

ACME DIAMOND TOOL CO.
15 MAIDEN LANE, NEW YORK, N. Y.

GREAVES REAMER DRIVER

A new reamer driver is offered by Greaves Machine Tool Co., 2013-7 Eastern Ave., Cincinnati, Ohio. It was designed to meet the modern production requirements of more efficient operation in less space. Consequently it is streamlined, fully enclosed, very compact, and easy to operate.

A foot switch controls motor, leaving both hands of the operator free to manipulate the work. The only exposed part is the 4" four-jawed universal chuck. All



else is fully enclosed. This new reamer driver is fitted with bronze bearings thru-out and the gears run in oil.

It has four speeds—30, 45, 72 and 115 rpm. Higher speed ranges are available on special order. Its capacity is $\frac{1}{4}$ " to $1\frac{1}{2}$ " reamers. A $\frac{1}{3}$ hp a-c motor—1725 rpm—110/220 volts provides the power. Compactness of the machine can easily be appreciated from its dimensions—length 14", width 12 $\frac{1}{2}$ ", height 8 $\frac{3}{4}$ ". Weight is only 110 pounds.

SCHAUER Speed Lathes

Ideal for
polishing,
de-burring,
lapping small metal
and plastic parts.



Ask for Cat. 440

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The No. 240

Here is dependable protection . . . a rugged helmet that is roomy, comfortable and well ventilated.

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GEARS and
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TWO MODELS *

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SPIRAL GEAR HOB-
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Manufactured by
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Zachrich Bldg., Defiance, Ohio
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SUPREME Brand

Hard Edge Flexible Back Metal Cutting
BAND SAWS



Have you been bothered with frequent band saw blade breakage, soft cutting edges, uneven set, or lack of proper temper?

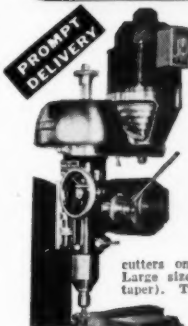
If so, put an end to such trouble by using SUPREME METAL CUTTING BAND SAW BLADES.

Available in continuous bands for any machine or in coil form for radius or pattern cutting machines. All sizes permitted by WPB. When ordered in 100' lengths, coils are packed in handy containers.

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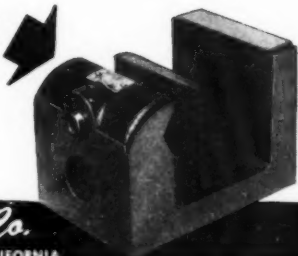
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Do away with guess work on cross center drilling of round or hexagon stock. No moving parts are involved, guaranteeing accuracy. Bushings are interchangeable giving wide range in hole sizes. Vise is equipped with $\frac{1}{8}$ " drill bushing. Since all surfaces are precision ground it can be used with any type of machine tool as a work holder and permanent accuracy is assured. Has V block with opposing jaw for unobstructed work. See your dealer or write us today.



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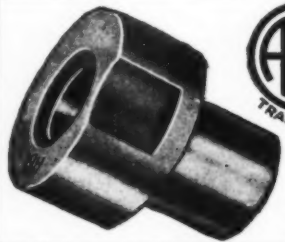
ROLLER TOP ELEVATING TABLES

The Lyon-Raymond Corp., 1777 Madison St., Greene, N. Y. offers a new optional feature for their Hydraulic Elevating Tables—a removable and reversible roller top. This brings to eight, the number of extras available to increase versatility of the elevating table. The roller top may be supplied when a table is ordered or it can be obtained for a table already in use.

Instant installation or removal of top is possible since framework fits down over permanent top, eliminating necessity for bolts or other fastenings. Roller top consists of a rigid, welded framework, supporting ball bearing conveyor rolls.

Since table top is square, roller top can be placed to convey from front to back, or from side to side. This understandably increases the table's usefulness for a great many applications.

With roller top, the hydraulic elevating table is commonly used in conveyor systems to accomplish a change in level or direction. It is also desirable in many die handling and feeding operations.



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SLIP RENEWABLE
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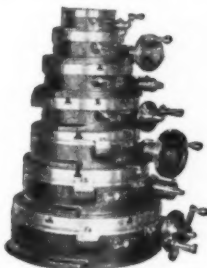
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1/2 Carat.....	\$ 9.85
3/4 "	16.50
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LONG LIFE — ECONOMY FEATURE

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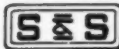
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"Cutting Fluids for Better Machining", a 60-page handbook, contains extensive data on steels, machinability, hardness, tools, speeds and feeds, and allied subjects, as well as on the selection and use of cutting and grinding fluids. Typical of the articles are "Metal-Cutting Mechanism", "Factors in the Selection of Cutting Fluids", "Precision Grinding with Oil", and "The Tool Edge Is Important". For a free copy, address D. A. Stuart Oil Co., 2739½ So. Troy St., Chicago 23, Ill.

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Shows
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24"x15"x7½—18 gauge. Drop handles both ends. Lots of 25 or more.

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CATALOG OF SUPERIOR FLUXES

A new catalog describing the complete line of "Superior" Fluxes is announced by Superior Flux Co., 913 Public Square Bldg., Cleveland, Ohio. Included in the line are 20 fluxes for welding, brazing, silver soldering, soft soldering and low temperature alloy welding of ferrous and non-ferrous metals and alloys.

Fluxes for silver soldering and similar operations are offered in both paste form and powder form. Different fluxes are available for welding, brazing and soldering all forms and alloys of aluminum. For cast iron and for copper there are both welding and brazing fluxes, and for stainless steel there are welding and soldering fluxes.

For each flux listed there is included a detailed statement of its characteristics and a full schedule of list prices. The catalog is attractively printed in two colors and has been arranged for easy selection of the correct flux for any individual application.

TRICO OILERS

Visible, automatic, care-free lubrication for all types of bearing surfaces.



- STOP GUESSWORK
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There's a style for every specific need.

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TRICO FUSE MFG. CO. Milwaukee, Wisconsin

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LABORATORY GRADED
PURE DIAMOND POWDERS

For GAUGES, TOOLS, DIES, etc., with tremendous TIME SAVING. These factors make STAR DUST indispensable in lapping and superfinishing on HARDSTEELS, TUNGSTEN CARBIDE, CHROME.

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There is a STAR DUST Field Serviceman in your territory.



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ONE SPRUCE STREET
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Book CORNER

AIRCRAFT SHEET METAL WORK—This unusually comprehensive 388-page volume tells how to do blueprint reading, tinplate layout, patterns for bends, riveting, soldering, brazing, welding and drop hammer work. It is planned to serve as a basic course of instruction for apprentices and other students of aircraft sheet metal work, as well as a refresher for mechanics who are more or less experienced in the work of this trade. The author is Clarence Allen LeMaster, member United Air Lines Supervisory Staff and the general contents were inspired by, and are based on his many years of experience as a mechanic in the trade and as a teacher of apprentices.

The first chapters have to do with safety rules, personal and shop-furnished tools, and blueprint reading. The author considers these of first importance, especially to beginners. The succeeding chapters progress from simple to more complicated processes and operations. Emphasis is always placed on how to do the work. Many instructive pictures show actual operation in the shop, plus an even greater number of drawings are used throughout the book to illustrate typical sheet metal work and all the principles are explained.

Questions and answers help the reader to test his accumulating knowledge.

The book is published by the American Technical Society, 58th and Drexel Blvd., Chicago, and the price is \$3.75.

ENGINEERING INSPECTION PRACTICE

—This is an unusually comprehensive guide to the methods, gages and instruments used in engineering production workshops. It treats of the reading of working drawings, limits and tolerances, linear and angular measurement, the mathematics of measurement, and measuring tools. Measurement of screw threads and gears is discussed, in addition to engineering materials and hardening processes, testing of metals and hardness, aeronautical inspection, etc. The book should be especially useful to sub-contractors and small manufacturers who now employ methods previously limited to large scale manufacturers. The information it presents in unusually clear fashion is important to the many individuals who are training for specific jobs of inspection as well as those who have the talent and ambition to complete training in all the methods of engineering inspection.

This 242-page book is by A. T. King. It sells for \$3.00 per volume and is published by the Chemical Publishing Co. Inc., 24 Court St., Brooklyn, N. Y. There are 246 illustrations as well as some useful engineering tables and specifications.

TREATISE ON PLANERS—While the basic principles of accurate planing have not changed, the design and construction of planers have been improved in many ways. These improvements have made it possible to produce better work than ever before—at lower cost and with less effort on the part of the operator.

Newer and better cutting tools, better and more convenient controls, and changes that have eliminated faults in old designs, have combined to make the modern planer more versatile and more productive.

The book is published by the Cincinnati Planer Co., Forer & B. & O. Ry., Cincinnati, 9, Ohio, for the express purpose of helping plane operators to attain the best possible operating results. There are many illustrations of planer details, and considerable space is given to descriptions of planer tools. Easily understood instructions are included for setting up work. Helpful tables and general data give a considerable amount of information on cutting speeds. Numerous explanations are given of typical planer work and a very comprehensive discussion covers the different types of planers and the details of planer construction. The book sells for \$1.00 per copy. It certainly should prove profitable reading for planer operators.

BROACHES AND BROACHING—97 pages, 8x11", 149 illustrations. Published under the auspices of the Broaching Tool Institute, 74 Trinity Place, New York 6, N. Y. Price \$3.

The purpose of this volume, which has been brought out by a nation-wide organization of broaching tool manufacturers, is to bring to American industry a comprehensive discussion of broaching practice, to call attention to the very rapid recent progress in the broaching field, and to emphasize the application of broaching to both war and post-war production. The Broaching Tool Institute is in an exceptional position to sponsor such a volume since the purpose of the Institute is to compile standards, encourage research,

and foster the progress of broaching for the benefit of the industry at large. The basic data for this book was chiefly contributed by the engineering staffs of the broach manufacturers who are members of the Institute. The principles outlined and the examples and practical applications cited are taken from the first-hand experience of highly qualified engineers in their daily contact with broaching problems.

A concise idea of the contents of the book may be obtained from a listing of the chapter headings:—History of Broaching; Advantages, Applications, Limitations of Broaching; Types of Broaches; Broach Cutting Action; Material to be Broached; Broach Design; Information Needed for Design and Manufacturing of Broaches; Broach Cost Factors; Handling Broaches; Sharpening Broaches; Broaching Machines; Setting Up the Broaching Machine; Fixtures; and Cutting Fluids.

HOW TO MACHINE PARTS ON TURRET LATHES—This interesting and helpful 64-page tooling guide has been published by Warner & Swasey Co., Cleveland 3, at \$1.00 per copy. It starts right out with a discussion of the fundamentals of planning tooling setups. Detailed instructions are given for analyzing the basic machine operations required. Numerous illustrations are given of drilling, boring, reaming, recessing and internal threading operations. The pictures are large and clear and the accompanying text is easily comprehended. Basic internal and external operations are discussed.

Many typical jobs are illustrated and described. Numerous types of tools are introduced and there is page after page of explanations and descriptions. Detailed data is given on production planning combining operations, grinding and setting of cutters, together with useful charts and tables. All in all, it's a very complete handbook of turret lathe operations.

ARC AND ACETYLENE WELDING—by Harry Kerwin, is a new 240-page book recently issued by McGraw Hill Co., Inc., 330 W. 42nd St., New York. It is designed for use of the general shop instructor or the beginning student, to direct and lead him thru the exact step-by-step procedure necessary to make an arc or an electric weld.

Special welding techniques are stressed, for the author insists the student must master the actual manipulative technique of welding before he can hope to advance to the welding of alloy metals, or intelligently study construction and joint design as applied to welding. Practical methods are given for controlling expansion and contraction, low-heat brazing, alloy welding and pattern layouts.

There are numerous illustrations showing welding equipment and its use. Many of the illustrations also show details of typical jobs.

Chapters are devoted to cast iron welding and cutting, hard facing and alloy welding, and brazing. Safety rules are studied as well as proper care of the welding equipment. Price is \$2.50 per copy.

HOW TO OPERATE A LATHE—Includes material of broad usefulness to production as well as tool room lathe operators. The illustrations, explanations and discussion of all subjects are specific and are clear and readily understandable. Accordingly, the book is adaptable to groups possessing wide ranges of interest and ability.

The question-and-answer technique is used very effectively. First, the question focuses the learner's attention on a specific problem or subject. Then the text comes immediately to the point and gives the answer while the learner's attention is directed to the particular problem.

A great many illustrations emphasize the fact that the text is one a beginner can readily comprehend.

This interesting, 161-page book is by John T. Shuman and Lewis H. Bardo. It is published by John Wiley & Sons, Inc., 440-4th Ave., New York, and the price is \$1.75.

THE CRAFTSMAN PREPARES TO TEACH—Many craftsmen and others from industry with little previous experience as teachers have been called upon to train workers for different industrial operations. This interesting 184-page book is written for their assistance, by David F. Jackey, Ph.D., Supervisor of Trade and Industrial Teacher Training, California State Department of Education, and Professor of Vocational Education, University of California, and Melvin L. Barlow, M.S., Assistant Supervisor of Trade and Industrial Teacher Training, California State Department of Education.

The book explains how to plan and organize subject matter to meet the required objectives of a course and describes the basic techniques of successful teaching.

Six steps in preparation of courses of study are given, with explanations illustrating each step. These steps are clearly explained, logically and easily for anyone to apply to any subject matter he chooses. They show how to establish the objectives of a course; how to select the subject matter, divide it into progressive lessons, plan each lesson, organize the shop work, check on the work, etc.

Fundamental teaching methods and essentials of the psychology of learning are then explained—the skillful use of questions, demonstrations, recitation and discussion, experiment, shop work and tests. Methods are given for creating and holding interest; how to make allowances for differences in learning abilities of the students; proper use of available materials such as models, charts, etc. as teaching aids.

Helpful suggestions are given as to the supervision of shop work and the preparation and grading of tests. The book is simply written, brief and to the point, and is an excellent guide for anyone preparing to teach industrial workers.

It is published by the MacMillan Co., 60-5th Ave., New York, and sells for \$2.00 per copy.

LATHE OPERATIONS—This book presents an unusual compilation of essential information for performing various lathe operations. The technical data is organized in such a way that it can be studied before or during the time the student is performing the assigned operation. Moreover, it gives him the type of information that must be known to accomplish the required results.

The author, Lewis E. King, M.S., is an experienced tool maker. He has had several years' experience teaching machine shop in the comprehensive high schools and trade schools of Detroit. Thus, material in the text is an accumulation of information from trade as well as teaching experience. It is felt that the technical information given in this book covers all the essentials for an understanding of lathe operations. There are 120 pages with many illustrations. The book is published by The MacMillan Co., 60-5th Ave., New York, and costs \$1.75 per copy.

MACHINE SHOP PRACTICE—The basic principles of machine shop practice are set forth in this handy book, simply and clearly and in a unique manner. An outstanding feature is the series of drawings illustrating the right and the wrong methods of performing common shop operations.

However, the book is much more than a series of diagrams, for the captions to the illustrations present a text of concise, easy-to-understand instructions.

In addition, there are many valuable notes of general workshop procedure, the handling

of machine tools, lubrication, calculation of cutting speeds, milling operation, cutting compounds, etc.

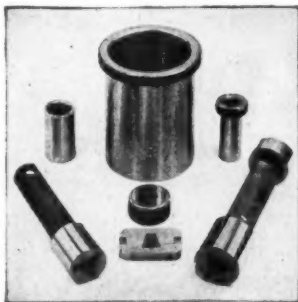
This interesting and decidedly helpful shop book is by H. Grisbrook and C. Phillipson. It includes 91-pages with a great many illustrations. It is published by Emerson Books, Inc., 251 W. 19th St., New York, and sells for \$1.50 a copy.

PRACTICAL DESIGN FOR ARC WELDING—Vol. 1, by Robert E. Kinkead, Consulting Engineer, Welding; 100 design plates, cloth bound, 8 $\frac{3}{4}$ x11 $\frac{1}{2}$ ", published by The Hobart Brothers Co., Hobart Square, Troy (1), Ohio. Price \$3.50 per volume (complete 3-volume set, \$10.00).

This is the first of three volumes to be published by Hobart in response to many requests, following the original publication and distribution of a number of the design plates in loose leaf form.

A practical working book for the welder, manufacturer, engineer, and designer who are working and thinking of the advantages of arc welding in their present and post-war production. It is not a text book, but an illustrated store-house of information and detailed drawings showing how tubing, plate, sheet, standard steel sections, angles and bars can be used to fabricate better, stronger, improved appearing products with arc welding and do it at substantially lower cost.

PLASTICS MOLDS—This 136-page book is by Gordon B. Thayer, M.E., and was published



THE manufacture of Drill Jig Bushings and the manufacture of Gages are so closely related that Economy Tool has found it most practical to specialize in the production of both.

This kind of a set-up also enables us to manufacture various other hardened and ground precision parts, including Centerless Grinding and Super-finishing, in limited quantities.

Experience through the years tells us that your job can be no better than the tools applied in the making. Your production standards are high for a reason. Nothing will suffice unless it meets specifications exactly as you prescribe them.

Precision, therefore, has become a law to us. Tools are made to keep you at top production with minimum cost.

Write today for particulars

ECONOMY TOOL & MACHINE CO.

MILWAUKEE 14, WIS.

by American Industrial Publishers, Fairmount-Cedar Bldg., Cleveland 6, Ohio. This second edition sells for \$3.50 per copy.

The first edition of this book appeared some three years ago as "Plastics Mold Designing" and served to fill an immediate need among designers, builders and users of molds for a concise and practical guide. Mr. Thayer has incorporated many suggestions by readers and has added material to bring this new edition abreast of many new developments in the field.

The Nomenclature of Plastics Molding has been enlarged. The number and scope of mold designs has been increased greatly and extended. A new section on practical points in mold design and construction should be especially valuable as a check list for all who design, build and use all types of molds.

The book contains numerous illustrations and drawings. The information is presented in clear, concise way and should certainly be a very useful handbook for anybody in this rapidly growing field.

LIQUIDATION OF WAR PRODUCTION—V-day will bring with it a crucial interval during which war production must be liquidated, peacetime production must rapidly get under way, and expansion must be initiated. The method of handling these matters and the transition from war to peace will have a vital bearing on our ability to attain and maintain high levels of production and employment.

The author, A. D. H. Kaplan has analyzed the nature and the scope of problems that will confront us. He points out the factors that will have to be given greatest emphasis in the likely conflict of interests. He indicates the criteria by which decisions should be made and the responsibilities that will fall on business as well as on government.

Dr. Kaplan presents 41 specific points that will enter into any program if it is adequately to meet problems of war contract cancellation, war plant and surplus disposal. The problem as a whole will be one of the most complex economic tasks the nation has ever faced. Large as the magnitudes are, Dr. Kaplan's report indicates that they do not justify defeatism. Careful preparation, clearly defined policies and proper administration should enable the task to be done to the benefit of our economy.

The book is published by McGraw-Hill Book Co., Inc., New York, and sells for \$1.50.

OPERATING AN ENGINE LATHE—This 62-page book is intended primarily to present practical lessons for the beginner. It is by Ray S. Lindenmeyer, Assistant Professor of Industrial Engineering, Northwestern Technological Institute. It starts right out with the fundamentals, acquainting the reader with all lathe parts and their functions. Special accessories are introduced along with attachments that are frequently required. Simple instructions are given for figuring correct speed and feed and for setting the different types of cutting tools accurately. Some attention is given to micrometers and gaging tools

including indicators for setting and testing work.

A chapter is devoted to drills and reamers. Some pertinent things are told about tapers, thread terminology, files, taps and cutting lubricants. Additional chapters cover heat treating, operation sheets, aligning centers, and mounting work between centers. From there on, practical jobs and operations are covered and there are numerous illustrations of typical steps.

The book is published by Science and Mechanics, 154 E. Erie St., Chicago, 11, Ill., and costs 50c per copy.

PRECISION MEASURING TOOLS—A useful, comprehensive and complete catalog and handbook No. 32 has been issued by The Van Keuren Co., 176 Waltham St., Watertown, Mass. Bound in handsome blue Fabricoid cover, it illustrates the broad range of precision equipment offered by Van Keuren and tells just how it is used. Considerable space is devoted to light wave determination of flatness. Solid square master blocks are presented and also microgages, wire type plug gages, cylindrical standards, measuring rules and thread measuring wires receive appropriate attention.

A considerable number of engineering tables, specifications and diagrams are included along with a vast amount of useful general engineering information.

This book certainly should be valuable to anybody whose daily work includes precision machine work, inspection or measurement.

UNIVERSAL CUTTER AND TOOL GRINDING—A very useful 28-page book has been issued by the Covel Mfg. Co., Benton Harbor, Mich. Priced at \$1.00, it is written primarily for the purpose of aiding operators, especially apprentices, in the art of tool room grinding. It is pointed out that there are a great many kinds, sizes and types of tool room grinding machines. While various makes differ in design and construction, the primary function and basic principles of construction and operation of given classes of machines are similar.

The operator's progress in this field is in proportion to his understanding of the machine he operates. Therefore, an effort has been made to outline as clearly as possible, the operation and achievements of the universal cutter grinder under conditions prevalent in most tool rooms. Many typical given jobs are shown with helpful explanations and suggestions.

HOW TO CUT WASTE—by Glenn Gardiner is published by Elliott Service Co., 219 E. 44th St., New York 17. It is an easy-to-read manual that should be a "must" in every foreman's reading.

It approaches the subject of waste from many important angles, such as the waste of material, waste of manpower, waste of machinery and equipment, and waste of work space. The causes of wasteful accidents are analyzed, as well as the waste resulting from

non-cooperation. A plan for enlisting workers in the war on waste is outlined. Single copies are offered at 35c each and the prices scale down on quantities.

Other helpful books are offered in this same series, bearing on the training of workers, handling of grievances, creating job satisfaction, increasing output, correcting workers and how to evaluate the qualities of a good boss.

RESISTANCE WELDING—A 28-page booklet GET-1189 issued by General Electric Co., Schenectady, N. Y. gives a great deal of interesting and helpful information on this modern method of metal fabrication.

Section I, part I, covers resistance welding methods and equipment. Part II is devoted to selection of equipment for best welding results; Part III is on welding electrodes and their maintenance, and Part IV covers material and its preparation for welding.

There are numerous interesting illustrations of equipment and typical jobs.

PRACTICAL METALLURGY FOR ENGINEERS—This is the fourth edition of an interesting and helpful book. This latest revised edition became necessary because of the mechanical aspects of the war, the tremendous expansion of the metal working industry in so many divergent channels, and because of greatly improved and rigidly main-

tained standards of measurement and testing.

While the function of this book is to deal with fundamentals and established practices, it has also included data on expedients which were tentatively adopted in the war emergency. Doubtless there will be more of these. Some of them will become standard while others will be abandoned with the return of peace. Meanwhile, the section on new steels records the developments up to July, 1944.

The volume represents a contribution to metal workers and engineers of the cumulative knowledge of metallurgy gained by the Houghton Research Staff during 78 years of study and operation. Members of the Houghton Research Staff have for years been called into consultation as "trouble shooters" in plants thruout the world. Thus their actual field experience is certainly widespread and covers practically every type of plant condition. Much of this vast accumulation of practical experience is written into the book. It is packed with valuable data for almost anybody in the metallurgical field. This is not a dull, dry text book. The information is presented in interesting, easily comprehended form and there are many illustrations. It is a publication of the Research Staff of E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia, Pa. Price is \$3.00.

AIRCRAFT SHEET METAL BLUEPRINT READING by Harry H. Coxen, B.S., M.S.; Gerald E. Jackson, and Gilbert D. Masters,

C-F POSITIONERS

In Any Welding Operation It's "Position" That Counts

Production welding usually means working on top, bottom and on all sides of the weldment. It means a "quick change" of position should be possible for greater time saving, more efficiency, lower costs and greater safety to men and materials. With C-F positioners a welder can quickly position even the most cumbersome weldments at the press of a button, without crane help or handling crews. With just one set-up of the weldment, he can position it easily, speedily and safely, all alone. He can rotate it a full 360° at variable speeds from 0.R.P.M. up, tilt it to 135° beyond horizontal, and can weld, downhand, all side surfaces and angles in the one set-up with larger rods and fewer passes. All C-F positioners, both stationary and portable, are pedestal mounted to give maximum floor and working clearance and all are adjustable for height.

Write for Bulletin WP-22

CULLEN-FRIESTEDT CO.

1321 S. Kilbourn Ave.

Chicago 23, Ill.



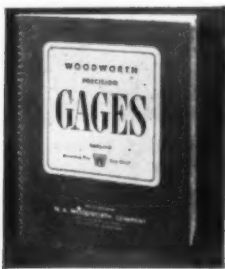
has been published by the American Technical Society, Drexel Ave. at 58th St., Chicago, 37. This is the sixth in a series of aviation books. It is written by eminent authorities who are qualified by years of "on-the-job" experience plus special training. The result is a how-to-do-it book that is ideal for beginners with no previous experience, as well as those who are experienced and want additional training to prepare for more advanced work.

The text concentrates on teaching blueprint reading in simple mechanical language, based on experience in training students to read blueprints easily and efficiently without the necessity for mastering drawing.

The volume, prepared in Workbook form, contains true and false tests and actual prints in various sizes. A series of questions with space for answers adjoins each print. These sheets may be removed without harming the book. Thus, the student learns blueprint reading by actually reading prints, and he is tested to make sure he has mastered each step. Price is \$2.50.

WOODWORTH GAGE CATALOG

N. A. Woodworth Co., 1300 E. Nine Mile Road, Detroit, manufacturers of precision machined parts and precision gages, announces its new Gage Catalog No. 44-G featuring three exclusive new gage developments.



The three special Woodworth products are—(1) the Limitol Gage which performs six visual inspection operations in one; (2) Carboly Gages with the Woodworth Exclusive Segmented Shank and (3) Gages of Cast Stellite Alloy.

Equally newsworthy to the product introduction is the Woodworth announcement that Catalog No. 44-G lists specifications under H-28 Standards in addition to the H-25 Standards which have been in use since 1938. It is the first time H-28 Standards data has been published in a manufacturer's catalog.

In compiling the book under H-28 Standards, the Company declared its be-

lief that after the war there will be a general adoption of these Standards. Several large corporations have led the trend towards accepting the new specifications.

The complete line of gages manufactured by the company include:—precision thread plug and thread ring gages, cylindrical plug and plain ring gages, profile and contour gages, fixed snap gages, special built-up and flush pin gages and a comparator type roll thread snap gage.

SOSSNER TAP HANDBOOK



A very practical and helpful catalog No. 44 has been issued by Sossner Tap & Tool Corp., 161 Grand St., New York, 13, N. Y. The point that impresses you right away is the ease of using this new handbook. A sturdy, practical binding with substantial spacers and unusually effective index tabs makes it easy to find the different sections. The book opens flat and it should stand plenty of hard handling. Preliminary glimpses into the Sossner shop show equipment and manufacturing methods. Basic tap terms are explained and pointers are given on tap selection for the desired class of fit.

Part III introduces the standard taps, followed by the specials. Tap limits and tap dimensions are covered adequately and a considerable amount of helpful engineering information is given in the appendix.

The handbook is available without charge to all tap users, upon written request on company stationery, giving name and position of the writer.

EXPLOSIVE RIVET MANUAL

Uses of explosive rivets in peace-time production jobs—in addition to application in the aviation industry which is taking virtually all the supply now—are discussed fully in a new manual published by E. I. du Pont de Nemours & Co., Explosives Dept., Wilmington (98) Del.

The explosive rivet was developed to meet the need for a quick, sure "blind" fastening in hard-to-get-at places in air-

craft. First a rivet was made with a small explosive charge in end of shank. Heated by an electric riveting iron, the charge formed a barrel-shaped closing head.

Du Pont now has developed an improved rivet with the charge running full length of shank. When the charge is fired, not only does the blind end form the same barrel-shaped head as before but, in addition, the shank fills the hole thru which it passes. Thus rivet holes need not be drilled to such close tolerances.

The booklet cites these post-war uses of explosive rivets:

1—Automotive—in construction of bus and passenger car bodies.

2—Refrigeration—in construction of cabinets for homes, locker plants and farms.

3—Housing—in construction of modern prefabricated houses.

4—Heating, Ventilating and Air Conditioning—In construction of units and closing of ducts which can be reached only from one side.

5—Radio Manufacture—in sealing radio units and production of cabinets.

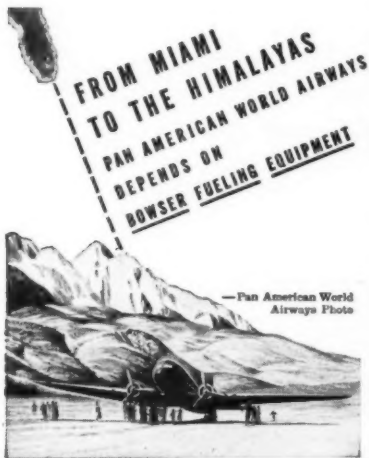
6—Shipbuilding—in construction of duct work aboard ship and in assembly of small boats.

7—Household appliances—in manufacture of washing machines and other household aids—even to attaching name plates.

GORTON ACCESSORIES



The George Gorton Machine Co., 1409 Racine St., Racine, Wis., is offering a 20-page bulletin on their Super-Speed Mill-



End of the aerial Burma Road—This plane, refueling after bringing a load of vital supplies over the Himalayas, is in the fleet of China National Aviation Corp., Pan American's affiliate in the Orient. This deadline setting is typical of the extremes in which Bowser Fueling Systems are working to help keep air transport operating.

Peacetime or wartime, in modern Miami or the remote Himalayas, Pan American World Airways fueling equipment must be sturdy, dependable, accurate. It's significant, then, that Pan American depends so widely on Bowser fueling units at its bases both here and overseas.

Dependability and accuracy... that's why, too, hundreds of companies in scores of different industries rely on the wide range of Bowser liquid control equipment. Here's a typical case-history:

A leading safety razor blade manufacturer installed a Bowser Continuous Filtration System to remove steel and grinding wheel dust from grinding and honing oil. Results—1. Contamination of the oil reduced from 88.0 milligrams per quart to 0.5. 2. Grinding and honing speeded up 50%. 3. Wheel dressing reduced 95%. 4. Finish on the blades greatly improved.

Somewhere in your plant, you can enjoy similar savings and benefits from some type of Bowser equipment—Meters, Proportioners, Filters, Lubrication Systems, Oil Conditioners, Pumps, etc. Write today. BOWSER, INC., Fort Wayne 2, Indiana.



Not only has Bowser's war production earned the Army-Navy E... Bowser equipment has helped earn it for scores of other companies.

BUY
WAR BONDS



The Name That Means EXACT CONTROL of Liquids

ing Machines. Five models of Adjustable Ram-Knee Type Gorton Machines, capable of spindle speeds up to 12,000 rpm and employing either vertical or universal heads, are described. Two new specification sheets and two pages of comparative data on the entire line of Gorton Milling Machines are included, along with detailed illustrations identifying each part and an explanation of each function in the performance of the machines. In addition, numerous Gorton accessories designed to increase work range and save time are illustrated and their specifications and applications listed. In writing for your copy, ask for Bulletin 1400-C.

HOKE TYPE CARBLOX

Lincoln Park Industries, Inc., 1731 Ferris Ave., Lincoln Park 25, Mich., announce Carblox cemented-carbide gage blocks in the Hoke (square) type.

It is known that accuracy cannot long be expected of gage blocks made of steel or other materials which are used continuously as master or working sets for comparative measurements. However, as a series of wear blocks to be used on the ends of a gage block build-up, Carblox provide a means of greatly reducing the

wear error in gage block use, supplementing and increasing the useful, accurate life of your present gage block sets. They act as protective anvils, preventing wear on the less wear-resistant steel blocks. They can, of course, also be used as individual blocks.



Carblox are practically non-magnetic and are highly resistant to rust and corrosion. Their square Hoke form allows easy handling, provides large symmetrical working surfaces and reduces wear by overcoming the tendency to wring the gage blocks together always in the one direction.

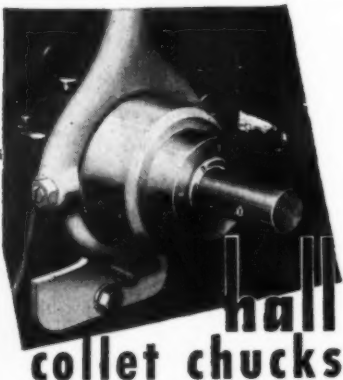
Hoke type Carblox are .950" square with .260" holes and are available in either "A" accuracy (.000004") or "B" accuracy (.000008") in sets of two .050" or .100", in sets of four (two each of .050" and .100") and in sets of 14 varied sizes. The set of 14, supplemented with the standard 81-piece set of gage blocks, provides build-ups of practically any desired range. Special sizes can be furnished.

SWIRT METAL CLEANER

The Phillips Chemical Co., 3414 W. Touhy Ave., Chicago 45, announces Swirt, a new addition to their line of controlled cleaning chemicals. This is a powerful emulsifying cleaner that is claimed to be harmless to the worker and the work. It is said to act efficiently upon all types of soil:—grease, buffing compounds, cutting and machining coolants and oils, and is equally effective upon ferrous and non-ferrous metals.

Swirt is claimed to give off no dangerous or disagreeable vapors to injure or annoy the operator; it is practically odorless. Being neither acid nor alkaline it will not etch or pit and can safely be used on the most sensitive metals and alloys. Fire hazards are reduced because of its high flash point, (155° open cup).

It may be used in practically any sort



All grip—no slip . . . no bearings, friction, heat or lost power . . . push out type . . . full spindle capacity or over . . . automatic adjustment . . . work re-set without stopping lathe . . . 2 sizes, 1" and 2" capacities . . . order now with proper priorities.

Immediate deliveries.

HALL MANUFACTURING COMPANY

622 Tulareana Dr. ★ Ph. NO 17570 ★ Los Angeles 26, Cal.

of container, from a bucket to a thermostatically controlled heating tank or degreaser. Its operation is simple—merely rinse in Swirt and flush with plain water.

It is economical as it does not dissipate readily by evaporation and it stays clean longer because most of the soil and grease is carried off in the water rinse.

In automatic washing machines Swirt is effective in very weak dilutions; for equipment maintenance it may be used as a spray.

CARBIDE GAGE BLOCKS



Exceptional accuracy over a longer period of time is claimed for the new Carbide Gage Blocks, offered in sets by Jansson. Made of tough, wear-resistant tungsten carbide, these blocks are said to be held to extremely close limits, often well within claimed tolerances.

Three all-carbide sets are available, of 10, two, and two blocks respectively, and one set of 81 steel blocks with two .050" tungsten carbide wear blocks. The Jansson 10-block carbide set ranges in size from .050" to .0509" in steps of .0001". The two smaller sets are intended primarily to be used as wear blocks with steel gage blocks. One contains two .050" blocks, the other contains two .100" blocks. Shown are the 10-block set and a two-block set, size .050".

Among other advantages claimed is the remarkable ease with which they wring to form combinations, a factor of particular importance in handling small sizes. All sets are packed in durable, attractive cases, finished to reveal the natural grain of the wood. For further details on these and other items in the Jansson line of precision products, write the Jansson Gage Co., 19208 Glendale Ave., Detroit 23, Mich.

PALMGREN ANGLE VISES



Solve Difficult Angle Jobs

- ★ For Tool Room — Production Line — Bench.
- ★ Speed up work — End Makeshift Methods.
- ★ Quick Accurate Setups at any angle.
- ★ Sturdy Longlife Construction.
- ★ All Parts Accurately Machined.
- ★ Jaws Hardened Steel — Plain or Grooved.
- ★ Made in Sizes from 1½" to 8" Jaws.

Write for circular 0-12 101 Angle Operations, and complete line of PALMGREN Vises.

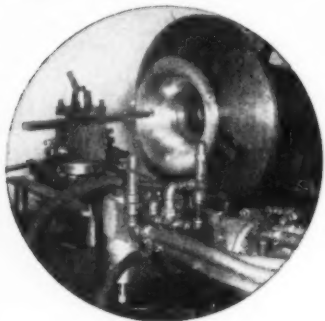
DRILLING
MILLING
GRINDING
FILING
FITTING
MARKING



CHICAGO TOOL & ENGINEERING CO.
Mfrs. of PALMGREN PRODUCTS for over 25 years
8384 South Chicago Ave., Chicago 17, Ill.



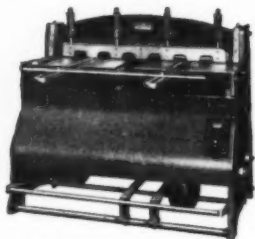
CUTTING VARIABLE CONTOURS



A new application of the Turchan Hydraulic Follower Machine, whereby a lathe can now be used to machine curved surfaces of variable contours, an operation heretofore impossible except by the laborious method of "cut-and-try", has recently been announced by the Turchan Follower Machine Co., 8259 Livernois, Detroit 4, Mich.

WHITNEY-JENSEN PRODUCTS 30 YEARS EXPERIENCE

POWER SQUARING SHEARS



Easy working, fast action, accurate blade adjustment, adjustable front and back gages, motor and clutch under apron. Made in three sizes—36", 42", and 60" width. Highly efficient machines for jobbing or production work.

Write for particulars.

WHITNEY METAL TOOL COMPANY
115 FORBES ST. * ROCKFORD, ILL.

How the operation is performed is evident from the illustration which shows a circular magnesium housing, approximately 17" in diameter, with three different radii and tapers, being machined on a lathe equipped with a Turchan attachment.

Using a master pattern or template as a guide, the attachment follows the contour so exactly that the housing is finished to a tolerance of .001" on both inside and outside diameters.

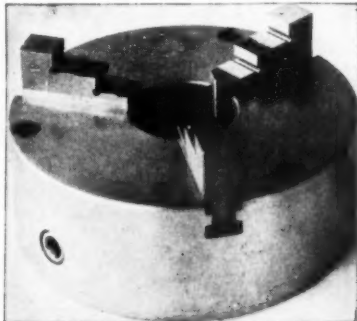
Finishing a complete cut every 15 minutes, the attachment makes it possible to perform in approximately an hour, a machining operation which by former hand methods might have required several days.

IDEAL "UNIVERSAL" CHUCK

The Ideal Commutator Dresser Co., 1441 Park Ave., Sycamore, Ill., announces a new Universal 3-jaw Chuck to supplement their line of machine tool accessories.

This chuck is inexpensive, yet precision-made to assure accurate turning. Body is of high-grade, fine grain, high tensile strength semi-steel. Ample resistance to shock, load and unusual stress is provided by rib construction.

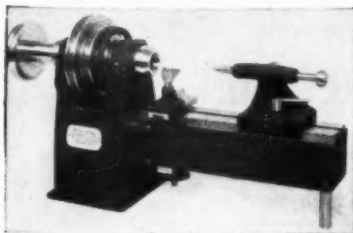
Scroll is made of alloy steel and has heavy proportions for true turning and long life.



Two sets of jaws are furnished, one for internal and the other for external work. Jaws are made of specially treated alloy steel to give toughness and strength. If one jaw is damaged, it can be replaced readily.

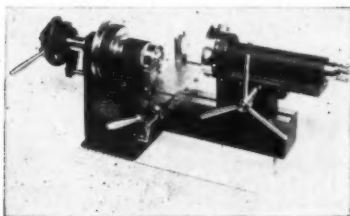
At present, this chuck is available in the 5" size only. A mounting adapter is furnished with each so that chuck may be accurately fitted to the particular lathe on which it is to be used.

FOWLER INSTRUMENT LATHES



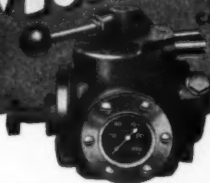
An interesting Model V Fowler instrument lathe is offered by R. P. Gallien, 220 W. 5th St., Los Angeles, 13, Cal. It has a maximum bar capacity of $\frac{1}{2}$ " ; maximum distance between head and tail stock is 6" ; maximum swing is 4" and bed is 9" long. Maximum spindle speed is 3000 rpm. Split type adjustable bronze bearings with oil cups are provided; 1A or 3C collets are used, available from $\frac{1}{32}$ " to $\frac{1}{2}$ " in 32nds.

Two sizes of instrument lathes with turret heads are available, with $\frac{3}{16}$ and $\frac{1}{2}$ " bar capacity, with 9" bed and 4" swing. The $\frac{3}{16}$ " size uses watchmaker lathe collets; the $\frac{1}{2}$ " size uses 9" bench lathe collets, style 1-A. The turret revolves vertically and has five stops.

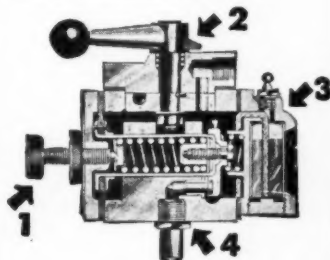


The $\frac{1}{2}$ " bar capacity Model L has maximum distance between turret and spindle of 5" ; maximum swing is 4" . Bed is 9" long; maximum spindle speed recommended is 3000 rpm. Front bronze spindle bearing is tapered and rear bearing is straight. Maximum turret ram travel is $2\frac{1}{2}$ " ; turret bores are $\frac{1}{2}$ " dia., and turret is operated by hand wheel. Cross-slide tool posts are designed for maximum of $5/16$ " tool bits and adjustable for height. Spindle is lubricated by wick feed. All castings are normalized and maximum hp recommended is $\frac{1}{4}$. Drive is by Vee belt, using 0 size belts with 3-step pulley.

Marton



This convenient unit is adaptable for all air operated machines wherever air control is required. Pressure regulator, gauge, strainer, lubricator and control valve are combined in one efficient, time-saving mechanism.



1. **Pressure Regulator**—accurately varies pressure from 5 lbs. up to 100 lbs.
2. **Control Valve**—arranged for two-way operation of double-acting cylinders and mechanisms.
3. **Lubricator**—maintains constant, efficient lubrication.
4. **Strainer**—keeps out final dirt and foreign matter.

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Beverly, Massachusetts

13/14 Parkshot, Richmond, Surrey, England

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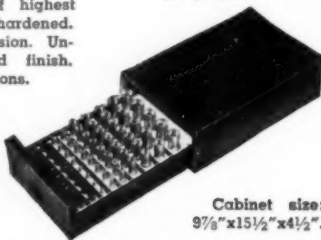
Complete in one cabinet, (86 pins)

Gauging members of highest quality gage steel, hardened. Ground to finest precision. Unequalled UPPCO-Lapped finish. Tolerances to specifications.

Strong moisture-proof cabinet walnut finished. Each gage clearly designated in white in metal strip behind.

Fractionals

1/64" to 1", in increments of 1/64". Complete in one cabinet (64 pins).



Cabinet size:
9 7/8" x 15 1/2" x 4 1/2".

Send for details and prices. Ask for complete Catalog. Shows DUBLIFE Reversible and other plug gages of A.G. design. Wire or write

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CHICAGO 18, ILL.

JET-PROPELLED PLANES

General Electric engineers can now disclose some of the advantages of jet-propelled planes which the Company is equipping with gas turbine engines. Among these is the fact that the propellerless craft can take-off almost from scratch, without the warm-up required by conventional ships.

"Full thrust from the gas turbines is available in approximately 30 seconds after they are started, thereby eliminating any delay for warming up the engines.

Disclosure of this and other information about the jet plane power plant was

one moving part. Air is taken into the turbine, compressed, and passed into chambers where its temperature is increased by combustion of fuel, creating hot gases which are discharged thru a tailpipe nozzle.

"Forward thrust of the plane is developed as the reaction to this high-velocity discharge in accordance with the physical law that for every action there is an equal and opposite reaction. A common example of this principle is the rotary lawn sprinkler, which is rotated in one direction by jets of water directed in the opposite direction."

permitted by the War Department concurrent with announcement of news that Allied jet-propelled planes have been used successfully by the British against German robot bombs. G-E is building gas turbines for the American version of the revolutionary-type aircraft, described as a single-seater, high-altitude fighter, and it has shown up well in tests.

"The jet plane turbines operate satisfactorily with either kerosene or gasoline, the former fuel having less tendency than gasoline to ignite in the open air," G-E engineers state. "When the jet plane is in full flight, no visible flames come out of the exhaust. And because continuous ignition is not required, radio interference and high altitude ignition problems are eliminated.

"The turbine is a compact, self-contained unit which has only

MECHANI-CUT BULLETIN

To meet need for a metal cutting saw having full mechanical drive, four-sided saw frame performance and finger tip control of feed pressure, Peerless presents the new Mechani-Cut model. This saw is designed to cut at higher speeds with precision and is convertible to manually operated conveyor operation on the job. It is available in capacities of 7x7", 11x11" and 14x14".

A new feature is the compensating feed unit. A highly sensitive rack and pinion feed compensates for hard spots in work and varying shapes and types of stock. This feed unit is mounted away from falling chips and coolant spray. Pressures are set by fingertip control and are adjustable to a fraction of a pound.

The massive four-sided saw-frame surrounds blade and work and permits locating bearings above and below saw-blade. Hardened and ground renewable inserts take strain and wear as saw-frame reciprocates.



The Peerless backing-plate, locked 1/32" above saw blade, gives added rigidity and permits maximum cutting pressures without undue injury to blade.

Illustrations and specifications are given in a new bulletin No. MC-51, available from Peerless Machine Co., 1600 Junction Ave., Racine, Wis.

DEBURRING AND FINISHING

A revolutionary new method of deburring and finishing metal parts and castings is described and illustrated in a new folder entitled "Slash Time and Cost with Roto-Finish". The booklet has been published by The Sturgis Products Co., Sturgis, Mich., owners of the potential Roto-Finish process. It shows how hand methods for deburring and finishing are eliminated, and these jobs performed mechanically on a production-line basis, more quickly and more economically.

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Every noisy shop phone should have a doorless Burgess Acousti-Booth. Telephoned instructions are clear... no chance for costly errors. It's quiet inside the booth... noises fade away. Thick-sound absorbent walls, exposed to the sound waves, soak up the rumble and roar of factory machines.

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HANDLING PIPE

The handling of pipe has various aspects. It must, of course, be handled where it is first made. It must be handled at factories where it is used in production, and it must be handled in countless plants, where the maintenance factor on pipe lines is concerned, whether underground, overhead or otherwise. Too, pipe comes in so many sizes that handling methods must differ in this respect.

It is interesting to know that firms making various types of conveyor chains, have developed a special kind of chain for hot bed and transfer service in the

handling of pipe. It is so constructed that every other link is fitted with an elevated pusher plate, thus causing the chain to provide a continuous series of saddles in which lengths of pipe can ride.

Heavy lengths for special pipe lines are often handled from point to point by means of a truck or tractor, equipped with a winch or cable reel, and an A-frame to support a sheave. Over the sheave wire rope or cable can be run, for lifting and carrying such pipe and other items.

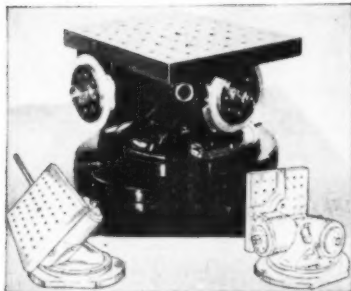
One such was noted, being used for handling heavy pipe inside of a factory. Tractor-mounted cranes are frequently used for handling heavy pipe out-of-doors, for underground pipe lines, etc.

On the other hand, heavy lengths of pipe are often handled thru a plant on a monorail system, when equipped with a suitable hoist.

Have you ever seen a truck fitted with a type of steel framing which made it especially suitable for the storing of various kinds of pipe, and for moving that pipe from place to place around the shop, as occasion may demand? Such pipe-handling trucks are in use here and there. In plants where various sizes and types of pipe are required, in relatively small amounts, they are profitable.

There are admittedly some shops in which it is not so necessary to transport pipe in small amounts around over the shop. In that case, pipe-handling trucks are often displaced by pipe-storage racks of similar type, centrally located.

UNIVERSAL COMPOUND ANGLE PLATE



A Universal Compound Angle Plate is announced by The Angle Computer Co., 5722-20 Melrose Ave., Los Angeles (38) Cal.

This tool, which is said to save about 50% of the time formerly consumed in set-up of work, can be used on milling

machines, shapers, planers, jig borers, drill presses, etc., to lay out, machine, and check work without removing work from plate. It can also be used as a 90° angle plate on machine or on bench.

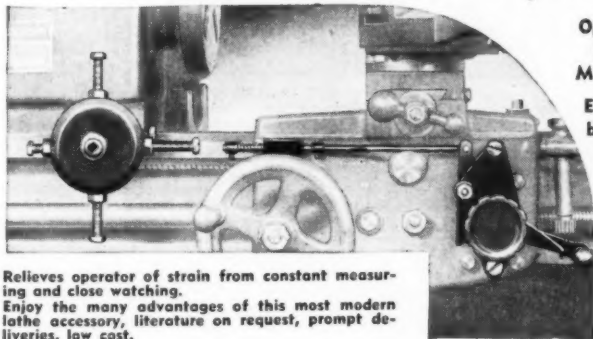
Plate holds work in any position from 0 to 90° in two planes 90° apart, and in any position within 360° of the radial axis, since the surface plate may be tilted 90° in two directions and also rotated 360° on base.

Calibration is accomplished thru use of two 5" and one 10" protractors, each graduated in half degrees, each with a vernier graduated to 1 minute and having an accuracy within 10 seconds of the arc. Each plane has its own locking unit, by reason of which the 11x12x1½" surface plate may be moved in any plane, leaving the other two planes securely locked in place. The surface plate is hand-scraped and is flat to within .0002". There are 48-¾-16 tapped holes located 1½" apart for clamping work to plate, and one ¾" reamed hole in line with radial axis of plate. Dimensions are:—Height, 8"; length, 14½"; width 11½"; weight, 155 lbs., approx. Bulletin No. 4 gives additional details.

The New



Automatic Feed Control for
Atlas and *Logan* Lathes



Operates the
half-nuts
Mechanically

ELIMINATES
back gearing
on most
operations

STOPS
accidents
to tools
& work

Relieves operator of strain from constant measuring and close watching.
Enjoy the many advantages of this most modern lathe accessory, literature on request, prompt deliveries, low cost.

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Life Savers!

IDEAL LIVE CENTERS

Four Standard Interchangeable Inserts Available for centered and uncentered work.

Increase Center Life. Handle heavier loads, make deeper cuts at higher speeds because they rotate with the work. Built for the precision jobs. Make your own inserts to fit your particular job.



IDEAL ETCHER- DEMAGNETIZER

Two tools in one! 14 Etching heats, 80 to 1350 watts. Cover removable for etching large parts. Demagnetizer has rating of 5.5 ampere. All parts enclosed when not in use.



IDEAL ELECTRIC TACHOMETER

Effective for checking all machine tool speeds. Equipped with a wheel for measuring surface speed in feet per minute. "Hand" Type and "Separable" Type—Two Ranges—0 to 2500 RPM and 0 to 5000 RPM.

IDEAL Sycamore

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COOLANT PUMPS

In some cases, application of a coolant pump to a machine must be quite carefully considered in the design of the machine itself. If one of the various types of standard pumps can be applied to advantage, it will be better to use it. If the new machine is peculiar in some sense, that may preclude use of a standard model pump, and certain manufacturers will build them to almost any out-of-the-ordinary specifications.

One firm building such specials, however, also supplies pumps that are of vertically-mounted type, and some that

are side-wall bracket mounted, the pumps being self-priming in either case.

Further, flange-mounted pumps and motor foot-mounted models may be obtained. Submergeable pumps may also be purchased, and portable models are supplied where they are desired.

Cases where specials must be built are relatively few. Whether water or light oil is being pumped for a coolant, equal efficiency is maintained. Design is such as to eliminate wear on these pumps to the greatest possible degree, and they are suitable for use where abrasives are encountered.

Installation flexibility for coolant pumps has been studied and provided more frequently by manufacturers of these units. One line of pumps is especially efficient for use where space is

limited. Not only are these pumps compact, but they are quiet in operation. There is pumping action at all times, regardless of grit or chips. Controlled flow of coolant is maintained while motor is running. These pumps are often supplied with spring tension packing, but a carbon seal may be supplied when it is preferred by the customer. They often accelerate production notably.

Some coolant pumps are provided with positive mechanical seals, and are especially noted for the fact that they are self-priming, never become air-bound. No pressure builds up at low speeds.

JESSOP CUTTING METAL



Jessop Steel Co., Washington, Pa., announces addition of an improved cutting metal to their already diversified line of cutting tools.

The new tool is a cast non-ferrous alloy made up principally of Chromium, Tungsten and Cobalt. Its hardness range is from 60 to 62 Rockwell C. This type of material is intended to bridge the gap between high-speed and cemented carbide cutting tools.

The new tool is cast-to-shape and is used in the "as-cast" condition, that is, other than being surface ground. Exceptionally high red-hardness is shown by the tool inasmuch as only one point drop in Rockwell C is noted at temperatures ranging as high as 1900° F.

In actual machine testing, this alloy tool has proven that increased feed, speed, and depth of cuts are possible on many applications where high speed tools are now generally used. Peak efficiency is realized when cutting at speeds from 20 to 80% over the top speeds for high speed tools. Because of the inherent toughness of the tool, intermittent cutting even of chilled castings is possible.

Jessop is able to furnish both flats and squares for tool holder bits or for milling cutter inserts, surface ground to tolerances of 0.000 and -0.005". Round sections will be centerless ground to the same tolerances. Die inserts or other complicated sections will be furnished in the as-cast condition.

CUT SET-UP TIME IN HALF

Free Circular Tells How

Learn how the "UNIVERSAL" 3-WAY ANGLE-SET VISE can reduce by 1/3 to 1/2 the time you now spend setting up jobs. Because it shows how to Save Time, Costs and Work in Tool Rooms, Machine Shops, Repair and Assembly Departments, thousands of Universal circulars have been requested for distribution to Department Heads and Branch Plants. Learn why Production Men in every industry rate this information valuable.

Send for your free copy today.

UNIVERSAL VISE & TOOL CO.

133 MAIN ST.

PARMA, MICHIGAN



Job Application Sketches illustrate new ways of handling angle-machining jobs.

TEAR OUT AND MAIL

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CRITERION *Boring Heads*

Original Accuracy *Maintained*

Noted for maintaining original accuracy over a longer period Criterion Heads are smooth, compact, rigid. Parts subject to wear are hardened. Lead screw is hardened tool steel, with threads ground from solid after hardening. All heads have large, graduated dial. Large offset adjustment eliminates need for offset boring bars. Two sizes: 1½" and 3". ¼" and 1" bar capacity. Shanks are interchangeable, enabling operator to use head on different machines. Ideally adapted for slide boring tool holder on small turret lathes. Ask your dealer or order direct. Request free literature.

Lead
Screw
ground from
Solid AFTER
hardening.



C

CRITERION MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

SIGNALLING

Signals of various kinds continue to play an increasing role in industry. Some of them are actuated manually, and some automatically under given conditions. Manual signals to attract the attention of given persons at a distance may be operated either by sight or by sound.

Pilot light units of jeweled type, in various colors, are used for signalling electrically to remote points. They are available in various sizes, depending on the distance from which they are supposed to be seen. Some have jewels only ⅛" across, while others are as large as an

inch. Red, green, amber, blue, opal and clear may be used, to indicate different persons, different processes, the beginning or ending of given time periods, etc.

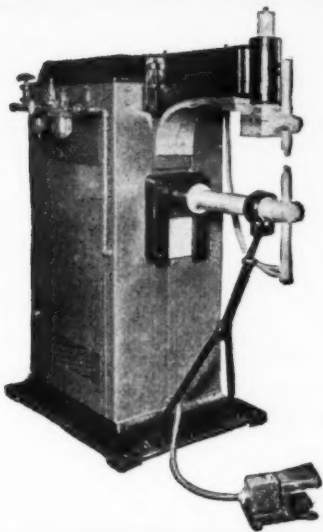
Sound signals, both by bells and by horns, are available in plug-in design for solenoid operation. Such sound signals may be used either alone, or in connection with the jeweled lights mentioned.

Used together, an extensive system of sight-sound code can be evolved and tailor-made to suit needs of any given plant. These sound signals are ordinarily used inside the plant, but they can be obtained in weatherproof construction for outdoor use.

Automatic signals having to do with intrusion of different kinds have become popular with many plant executives. Plants engaged on war work, and

encircled with protective fences, have in many instances made this protection even more certain by means of fence-mounted signalling units. These will automatically warn of any attempt to intrude, whether an effort is made to climb over, tunnel under, or cut thru the fences.

The units are vibration-sensitive, and the signals are automatically given at a central station, both in form of visible warning lights and by sounding a bell or horn. Even the circuit wiring for these devices is tamper proof, for if it is cut, the device will signal, and continue signalling until the damage is repaired.



REX SPOT WELDERS

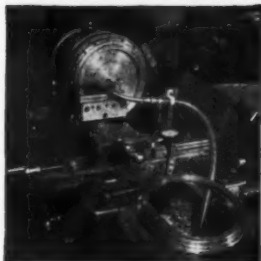
Rex Spot Welders are now obtainable in standard or automatic repeat (Stitch) air-operated Rocker Arm or Press type in 10-20-30-40-50-75-100-125-150-200 and 250 KVA capacities. Foot operated can be had in 2½ to 75 KVA and Motor Driven type in 10 to 100 KVA sizes.

Interstate Machinery Co., 1431 W. Pershing Road, Chicago 9, Ill., distributors of the Rex line, will mail illustrated and descriptive bulletins covering the types listed on request.

MURCHEY REFERENCE MANUAL

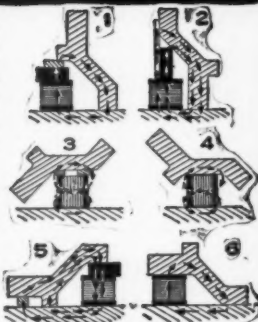
An attractive 44-page handy reference manual has been issued by Murchey Machine & Tool Co., Detroit, 26, Mich. The foreword outlines purpose of the manual and stresses the fact that the Company has endeavored to compile in one volume, facts, figures and other information of value to those engaged in selling, servicing and using Murchey threading equipment. Much of the information applies to the machine tool industry in general. Loose-leaf design facilitates addition of material. A complete table of contents makes it easy to find wanted data, and the volume is well illustrated with diagrams and charts.

NEW AND REVOLUTIONARY MAGNETIC CHUCKS FOR TOOL ROOM AND PRODUCTION



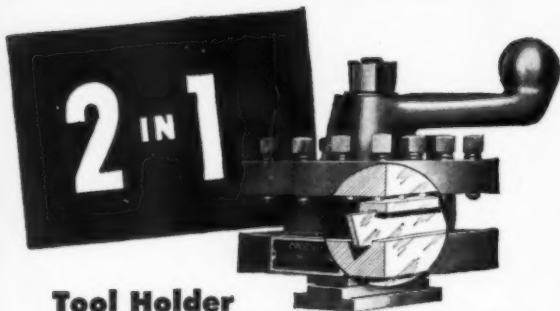
Following the arrows will quickly show how you may utilize the new Magnetic Circuit of our **POWER-GRIP Chuck** on surface grinders. The combinations of blocking, shiming, etc., are only limited by the operators experience and imagination. The holding power lost through the various blocks is negligible.

On a 10" Cast Iron ring, at Detroit—"We are pleased to say this has meant a 300% increase in production and a 5% decrease in scrap to this item." Square Tool, Die & Mfg. Co., (signed) W. Jackson, Factory Manager.



Furnished complete with combination Power and Control Unit for 110 Volts A.C. Circuits from stock.

ROCKFORD MAGNETIC PRODUCTS CO.
1018 Sixth Avenue Card Brings Catalog ROCKFORD, ILL.



Tool Holder and Cut-off Bit included with the Crozier Tool Post Turret at NO ADDITIONAL CHARGE!

Standard equipment with the accurate, high quality Crozier Tool Post Turret now is a specially designed holder and a high speed steel cut-off bit—at *no extra charge!* Not only is this exclusive feature (Patent Applied For) an immediate money-saver, it also increases production, provides more rigid tool support and reduces set-up time. The Crozier Tool Post Turret, the first to be made for bench lathes, retains its normal advantages of fast, close indexing, dependable accuracy and long life which have made it so popular. It is available for Small, Medium and Big lathes—with cut-off holder and bit *without additional cost, remember.* Write for details.

Crozier

CROZIER MACHINE TOOL CO., PRAIRIE AT 118th ST., HAWTHORNE, CALIF.

Successors to C-W-C Corporation

See Crozier Products at National Metal Congress, Cleveland, October 16th to 20th

AUTOMATIC SCREW MACHINES

Among the many improvements that have been made in screw machine practice, some deal with auxiliaries, as well as with the machines themselves. One of these is a silent stock support for wire feed screw machines.

Only the operator who has had to work day in and day out, in the noise that comes from the rotation of whipping stock in the regular screw machine stock pipes, can really appreciate what it means to be rid of this racket.

When using the silent stock support, the material revolves in a flexible metal guide, open at both ends, and is supported

in a non-metallic casing. This casing deadens the sound, and prevents the transfer of vibration. Vibration always accentuates noise if it is not dampened. Silent stock supports are made in various sizes, to accommodate different diametral capacities of different automatic screw machines.

Efficient screw machine practice, in plants having a great amount of such work, is based on the use of machines designed to handle work within a relatively small diametral range, especially when there is a lot of small - diameter work. The surface speed on small-diameter work will be too slow to be efficient, unless the rpm is very high.

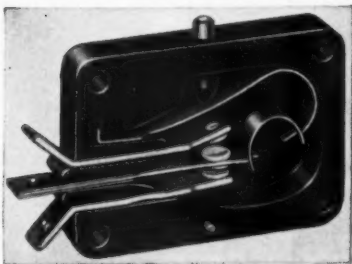
Consequently, some firms have produced machines that will handle a maximum diameter of

only $\frac{1}{8}$ ", and have speeded up these machines. This meets the requirements of manufacturers making large quantities of small screws, nuts, and similar threaded parts from different kinds of steel, as well as from aluminum, brass and other free-cutting materials.

Machines of this nature as made by one builder, dispense with the turrets, as ordinarily used, and substitute horizontal threading spindles, with cam-operated axial feeds. These spindles can be tooled to carry either threading dies or taps.

Automatic work defectors on modern automatic screw machines are interesting devices.

ACRO MINIACT SNAP-SWITCH



Reported to be the smallest fully enclosed snap-action switch, the new Miniac is only 17/64" thick, 13/16" high, and 1-3/16" long. It is engineered on the well-known rolling spring principle, but with a new design and smaller size. Fully enclosed in a bakelite case with 4 mounting holes 3/32" diam., actuation is with a stainless steel pin plunger. All parts are non corrosive and all contacts are of fine silver. Main blade, contact blade, and rolling spring made of beryllium copper. Rated at 15 amps., 115 volts A. C. Furnished in single pole, normally open and

normally closed, double throw. Designed to permit leaf type or overtravel plunger type actuators to be attached to the case. Manufactured by the Acro Electric Co., 1332 Superior Ave., Cleveland 14, O.

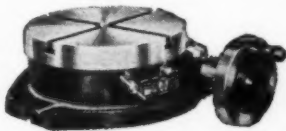
SCREW MACHINE PRODUCTS

Now being offered by the Eastern Machine Screw Corp., New Haven, Conn. is a 24-page Screw Machine Products Data Book for Postwar Planning, Bulletin No. 62. The book was prepared to assist companies in the proper design of screw machine products that are required for newly developed lines or equipment. Several pages are devoted to a discussion of the definition and advantages of screw machine products, selection of material, screw threads, thread fits, etc.

Diagrams include suggestions on drawings for screw machine products, and American National form of thread. Among many table are those listing sizes of tap drills for both coarse and fine thread series; general dimensions; T-dimensions of National Taper pipe threads; decimal-inch equivalents of millimeters and tenths of millimeters; decimal equivalents of drill sizes, and machinability of non-ferrous metals. Copy of this booklet is available upon request.

BRAND NEW PRECISION

ROTARY TABLES



9"	— \$ 97.00
12"	— 160.00
15"	— 185.00
18"	— 220.00
18"	— 350.00 Extra Heavy Duty

OUR ROTARY TABLE WILL TAKE THE PLACE OF A COSTLY FIXTURE. IT IS USED FOR ALL KINDS OF WORK ON MILLING MACHINES, SHAPERS, DRILL PRESSES AND HORIZONTAL BORING MILLS.

WE CAN ALSO FURNISH DIVIDING ATTACHMENTS.

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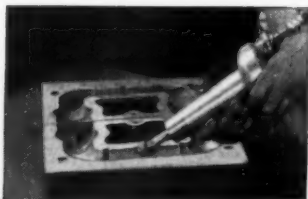
NEW YORK, N. Y.

38,000

RPM

PLUS 1/2 HP

Gets WORK out of these tools



Using 1/2" to 1" diameter wheels, the Onsrud E-1 Air Turbine Grinder really makes metal fly! The power-packed, portable 5 lb. E-1 gives these tools the high speed for efficient, heavy duty grinding. Runs for hours at less than room temperatures.

Get complete details by writing today for your free copy of our special Air Turbine Portable Grinder bulletin.

ONSRUD MACHINE WORKS, Inc.

3908 Palmer Street

Chicago 47, Illinois



**MACHINE TOOLS AND METHODS
FOR TOMORROW'S PRODUCTION**

TURRET LATHES

There may be some newcomers to the metal-working field who are confused between so-called hand screw machines and turret lathes. In one sense, at least, it is simply a matter of size, where both are working bar stock. Some builders of machines of relatively small diametral capacity have termed them hand screw machines and turret lathes, interchangeably.

One has a machine with an automatic indexing turret, that has a capacity of 3/8". Another builder provides a machine with a plain head, and a 1" automatic chuck. These may be used with either

hand or power feed.

Some efficient tools have been developed, for performing special operations on different kinds of turret lathes, both on bar work and on larger-diameter chucked work. At one time, a special tool was made up in the plant where it was used, for facing the bottom of a large bore. This necessitated imparting a cross-movement to a tool while it was located at the bottom of the bore, to provide a finishing face cut.



It is impossible to describe this tool fully here, but it can be said that the facing tool is held in a sliding block, actuated by means of a rack cut on the back of the tool-block, and a pivoted gear segment. The segment is supported on a pin or short shaft, and actuated by a yoke having a telescopic movement, which is a part of the tool, and has its motion parallel to the tool shank. In this way, the motion

of the turret, on a line parallel to the work axis, produces a movement of the cutter-holding block directly at right angles, and this movement is utilized for facing the bottom of the bore.

While this tool was made in the tool-room connected with the shop where it was used, doubtless turret lathe manufacturers would be in a position to provide similar tools, for use on any specific jobs where large lot sizes are involved.

In a general way, turret lathes divide into two different types; those for smaller diameter work and those considered as heavy-duty machines.

HYDRO-SQUEEZE GUN

A portable 1½ ton (capacity) hydraulic press with off-set platen and ram, identified as "Hy-Mac" Hydro-Squeeze Gun and built for pressures up to 1000 psi is announced by Hydraulic Machinery, Inc., 12825 Ford Road, Dearborn, Mich.



"O" ring-type seals are used on the piston. The ball-type switches are conveniently located on the unit to control a

spring-returned four-way valve. As long as both switch buttons are pressed, the valve solenoid is energized and oil under pressure is valved into the Hydro-Squeeze Gun moving the ram thru the working stroke of 1½". When one or both buttons are released, the valve solenoid is de-energized and ram starts the return stroke.

The off-set platen and ram are constructed to accommodate numerous special adaptors for various operations, such as pressing bushings and pins, riveting, dimpling, etc., reaching many hard-to-get-at places, formerly inaccessible to power tools.

TACHOMETER BULLETIN

Now available is a new 8-page bulletin, G-448 which describes and illustrates speed indicating and recording tachometers manufactured by Reeves Pulley Co., Columbus, Ind. These tachometers are offered as accessories for their Variable Speed Control units—the Transmission, Vari-speed motor pulleys, and the Motodrives.

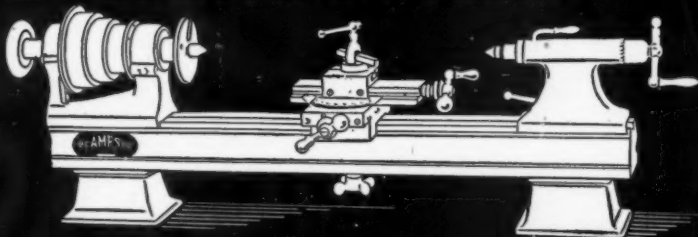
The bulletin contains interesting and informative material, as well as a number of diagrams, and suggestions on ordering their equipment.

AMES *Precision* BENCH LATHE

Known for 40 years as a precision lathe of the highest quality. Bed 36" long. Ball bearing headstock uses 1" capacity collets. Swing 8⅜" over bed. Available with motor drive.

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COMPLETELY ENCLOSED FOR OPERATOR SAFETY

In the Sigourney M-100 Drilling Machine all moving parts except the chuck and drill are completely enclosed for maximum safety in operation.

Ideal for fine precision drilling and maintained accuracy, the Sigourney M-100 has sealed ball bearings throughout . . . hardened and ground spindles . . . Standard Machine operates at speeds from 4,000 to 10,000 R.P.M.; other speed ranges available . . . manufactured in 1, 2, 3 and 4 spindle models.

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Hartford 6, Conn.

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PRATT & WHITNEY

Division Niles-Bement-Pond Co.

West Hartford, Connecticut

FLYWHEELS

We think of inertia as the resistance offered by a body at rest, to being set in motion. Actually, there is another kind of inertia, and that is the resistance offered by a body in motion, to being brought to rest.

The latter type of inertia can be useful. That is when it is incorporated into one or more flywheels in a mechanism, to provide a cushioning or carry-over effect where a load to be handled is pulsating; where it has high peak demands greater than the power of the driver, etc.

We have seen handwheels made with

extra heavy rims, to provide fly-wheel effect, as it is called. Give such a handwheel a smart spin with the hand, and it will do a considerable amount of work compared with the physical effort expended.

One such case will be found where a heavy-rimmed hand-wheel is applied to the screw of a vise, which holds workpieces in an efficient threading machine. The effort required for securely gripping the work is greatly reduced because the wheel is fitted with this heavy rim.

Machines requiring peak power at a given point in the operation cycle, can be operated with considerably less input power than otherwise required at the peak, if plenty of fly-wheel weight is incorporated.

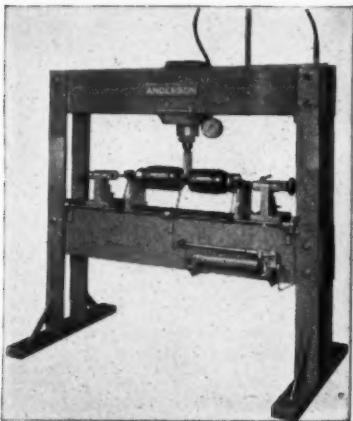
Heavy duty, up-setting forging machines are a case in point. Just at the place in

the crankshaft revolution where the metal is engaged and upset, a great amount of power is required. One builder of such machines makes them with large twin flywheels, one being mounted at either end of the crankshafts. In addition, there is a drop lock stop motion mechanism incorporated, that connects these powerful moving parts with the forging machine slides, converting a maximum of the stored-up energy into useful work.

Flywheels are useful in high speed milling with fly cutters. There are some cases where it becomes necessary to connect a flywheel with some other portion of a mechanism.

ARMATURE STRAIGHTENING PRESS

A high speed armature straightening press is offered by Anderson Bros. Mfg. Co., Rockford, Ill.



Three or more indicators are employed to check straightness of the shaft at vital points. They are attached to one pivot shaft and are all swung into position with one movement of the hand.

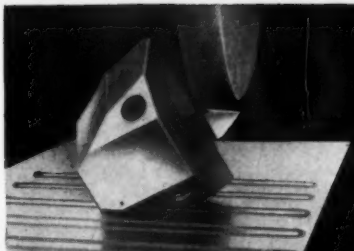
Spring mounted centers are mounted on a "V" slide which prevents tipping and accidents for especially heavy armatures.

Ram is of traveling type and rolls along on four pre-lubricated ball bearings. Hydraulic gauge is mounted directly on ram and is in line with operator's eye for quick reading. It will swing armatures up to 14" in diameter. Capacity of this press is 20 tons.

The total length is 65". Power is derived from a hand hydraulic pump. However, a press of this type with a power hydraulic unit is also available.

LEVER OPERATED CHUCK

Literature that describes and illustrates the four stand set-ups on Jiffy Jigs for drilling, milling, boring, and grinding, has been released by Monarch Governor Co., 1832 W. Bethune, Detroit, Mich. Stock size capacities range from 1/16 to 1" cross sections. These chucks can be used for either vertical or horizontal, set-ups and when collets are in either open or closed position, they are said to have zero axial movement. When the collets, particularly designed for the Jiffy Jig, are not available, Warner & Swasey No. 2 collets may be substituted.



GRIND

Both 29° and 60°
THREAD TOOL BITS

Accuracy, uniformity, and precision are assured in grinding both Acme 29° and National 60° left or right hand thread-tool bits, with or without rake on the cutting face. No graduated scales or moving parts to wear out. Two sizes, complete with adapters: Model A for the mechanic's tool kit \$16.75... Heavy Duty Model B for the shop \$35.00.



Fixture can be easily clamped to work table when magnetic chuck is not available.

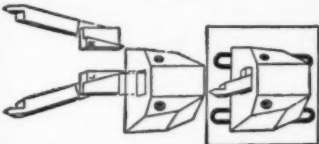


Diagram shows how to grind 15° right and left hand bent tools with standard adapters.

Write for new Catalog Dept. MTBB-12-GF and call
YOUR CLARK CUTTER JOBBER
TODAY!

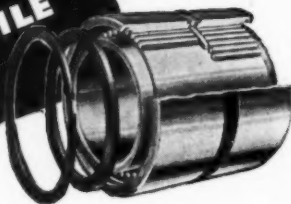
CLARK  CUTTERS

Robert H. Clark Company

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BEARING DIVISION — 1700 N. Lafayette St.

McGILL Manufacturing Co., Inc.
Valparaiso, Indiana

BILLETS

The handling of billets at the mills is a problem that has been solved, in many cases, thru making of special transporting chains for the purpose. Recently noted was a special type of chain being employed for carrying cylindrical aluminum billets thru a furnace at 900° F.

Other chains for the handling of billets, which must stand up under high temperatures, have also been noted. Another chain manufacturer has designed unusual chains for billet cooling beds.

Iron and steel billets can, of course, be handled to advantage around billet

yards by means of large handling magnets, such as are available for use with bridge cranes, etc. In many cases, it is found advantageous to do a certain amount of chipping and smoothing on billets at the point where they are to be worked, before sending them on into the plant for subsequent operations.

For this purpose, pneumatic chipping hammers are much used, and may be had from different firms, with chisels adapting them for such purposes. One manufacturer of portable pneumatic hammers produces chipping hammers of the sleeve valve type, which have proven very popular in billet yards.

Where billets being handled are non-ferrous, and are still very heavy, as in the case of brass, the handling problem obviously cannot be solved by a magnet. In the case of one copper and brass manufacturing concern, the handling and transportation of brass

slabs and billets from the molds to storage, or in some cases to saws and billet shears, was managed to advantage with a special fork truck, capable of handling 10,000 lb. loads.

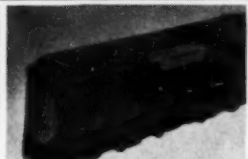
Shearing machinery for billets, incidentally, is of a special type, but is available from a considerable number of machine building manufacturers.

Billets are difficult to handle and manipulate around furnaces, hammers, and similar places. Special billet manipulators are in use in some places. These make it a simple matter to handle billets in and out of furnaces, under power hammers.

AVOID WELDING DISTORTION STRESSES AND OVERHEATING



Arc welding bomb-bait hanger on frame member of plane produced severe warping and misalignment. Eutectic Low Temperature Welding prevented distortion and formed strong joints.



Cast iron motor heads are safely repaired without danger of subjecting to stresses, eliminating need for costly and lengthy after machining always necessary to correct distortions.



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PROBLEMS

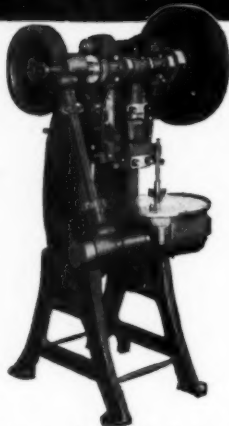
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Special application of Federal Dial Feed Press—with 30 stations, operating at 60 to 80 strokes per minute.

● Every day, Federal Dial Feed Presses are solving more production problems—performing a wider variety of jobs which, until recently, were not thought of as press operations. As a result, the need for highly specialized machinery of limited utility is often eliminated. And production speed is often increased 3 to 6 times!

Federal Presses will be equally effective tomorrow, for hundreds of uses in low-cost peace-time production—with practically no



reconversion costs. Orders are now being accepted for prompt post-war delivery.

THE FEDERAL PRESS CO.
612 Division Street, Elkhart, Indiana

FEDERAL
DIAL FEED
PRESSES

WRITE FOR NEW CATALOG

MOTOR CONTROL

The proper control of motors plays no inconsiderable part in the success of machining and other processes. It takes care of variations and out-of-the-ordinary setups, in such a manner as to eliminate the human element.

Time-cycle contactors are used, for instance, in many places, to operate motors at intervals, with specific regard to given periods of elapsed time. Some time-cycle contactors are designed to repeat on a given cycle periodically, as long as a line switch is closed.

In other cases, time-cycle contactors start from push-button switches, run thru

the time-cycles set, and then stop and remain so, until the starting switches are again actuated manually.

Time cycles involved with such contactors vary over a large range. Only a few seconds may be involved in some cases; in others the cycles may be based on a several-day period.

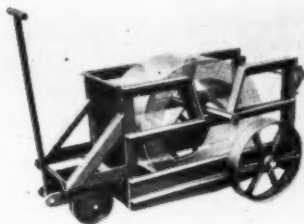
Time-cycle contactors are quite often used for automatically advancing loads in continuous-type furnaces, where specific dwell periods are involved. They are used for automatically timing material that is being electroplated, or stock that is being heat-

Automatic lubrication setups often incorporate time-cycle contactors. Automatic operation of hydraulic presses and other machinery is often effected thru their use also.

In some cases the chief idea is to arrange a machine so it will stop at the end of a given operating cycle, after a piece of work has been finished, etc., without direct attention of the operator. This proposition can be handled thru the arrangement of a suitable cam, timed properly with the machine operation, and deriving its motion from the machine itself, to actuate an electrical control switch of some kind. Some gear shaping machines, for instance, are provided with cam-operated switches in this manner. The idea is applicable to almost any type of mechanical unit.

Some synchronous motor controllers have actions based on the application and removal of field excitation as the need may appear.

COIL STEEL TRUCK



The continued increase in the width of strip steel, with a consequent enormous increase in coil weight, calls for stronger—and safer—means of handling.

To meet this condition Palmer-Shile has lately added an improved, heavy duty, Coil Steel Truck, to their line of specialized materials handling equipment.

This truck is built only on order, to take care of coils of the size and weight intended to be handled. It is built of heavy angle and plate. It is equipped with three heavy duty, roller bearing metal wheels. Safety bar at rear is chained to one side of truck. By removing this bar

coil can be rolled out at rear. Or it can be picked up by overhead hoist, by means of center bar shown.

While designed especially for handling heavy coil steel, truck is adapted also to handle coils of wire or other products of similar size and shape. Complete information may be had from Palmer-Shile Co., 782 South Harrington Ave., Detroit 17, Mich.

CLARK CATALOG NO. 44

The Robert H. Clark Co., Beverly Hills, Cal., announces release of a new Adjustable Cutting Tool catalog (No. 44). Printed in two colors and profusely illustrated with diagrams and photos of actual operations, the catalog contains complete specifications and prices, as well as detailed descriptions of the entire line of Clark Adjustable Cutting Tools.

According to the company, the unique principle of adjustability applied to cutting tools, which has proven so valuable in war production, is fully explained and the adaptability of these tools to reconversion programs is obvious.

An interesting feature of this new 12-page booklet is the handy index and ready reference which has been worked into the cover design.



Semi-Steel
Bow End Type



Semi-Steel
Rectangular Type

**BOLSTER PLATES
for POWER PRESSES**

*Why risk destroying an expensive set of dies
with worn or badly used Bolster Plates?*

**Now is the time
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Complete facilities at our Bridgeport and Detroit Plants for manufacturing any type of Bolster Plate to your specifications from Semi-Steel Casting or Steel Plate. Any size or shape can be made. Send template or drawing showing design needed. Prices are right. Deliveries fast.

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• Extra power and higher speeds for faster, smoother work on steel, non-ferrous metals, plastics, and most other materials. Speeds up to 35,000 r.p.m. under load reduce frictional wear on mounted wheels and cutters through lower operating pressure by as much as 50%.

STREAMLINED PLASTIC CASE

Practically indestructible case fits the hand and mounts in stand, vise, or lathe. *Guaranteed shockproof on AC or DC without ground wire.* For close jobs attach COOLFLEX Flexible Shaft which extends full power and speed to 9-oz. cool-running handpiece.



PRECISE PRODUCTS COMPANY
1331 CLARK ST. • RACINE, WIS.

THE PRECISE 35

AIR GRINDERS

A very wide range of work is now performed by means of portable air grinders, available in many different sizes and speeds. The designs of some of these tools incorporate balanced rotor blades made of Bakelite. These are very light in weight, and are also unaffected by oil, water or heat.

An automatic type of governor which keeps the free speed of the grinding wheel low, and reduces air consumption accordingly, is used on this line of tools. When wheel is applied to the work, it causes this governor to throttle the

amount of air and the speed required for the job. The governor is adjustable, so that it can be set for various speeds.

There are special air grinders, designed especially for locomotive work. Familiarly known as rod grinders, they surface locomotive frame jaws, rods, straps, rod brasses, shoes, and wedges, welds and valve motion parts. These little machines, while incorporating considerable power and stamina, can be fitted into a $2\frac{3}{4}$ " space, and applied on many tight jobs, other than locomotive work.

Surface cracks are often removed from billets. Iron and steel castings are also ground, with air grinders. The finishing of large dies is also speeded thru their use. Circular wire brushes are often mounted on such grinders for cleaning off rust, old paint, scale and other accumulations. Polishing and buffing wheels are

also used to advantage, for various kinds of polishing work.

One portable air grinder, that uses a heat-treated cylinder, ground and then honed to glass-like smoothness, has four power vanes to give a smooth, non-pulsating flow of power. One firm has a line of these little machines adapted for the use of many different diameters of wheels. In fact, they have one small model fitted with a collet, to hold a $\frac{1}{2}$ " diameter emery stick. The same model can be fitted to carry wheels $1\frac{1}{4}$ " and 2" in diameter.

Some of the larger models will carry 8" wheels.

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Propelled by electricity, compressed air or flexible shaft, this new tool will rapidly saw or file light and heavy gauge metals of every description, corrugated or plain. It's ideal for panel notching in metal, wood, plastics and other materials. In fact, the Saw-Gun may be used advantageously in a wide variety of applications.

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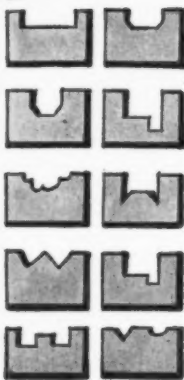


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engines
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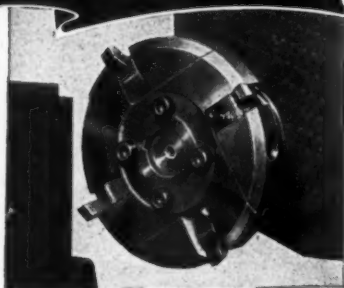
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11121 GRAND AVE. • DETROIT 4, MICH. • HOGARTH 9164-S

Newfield UNIVERSAL FLY CUTTER



Above—a few of the many cuts that can be made with the Newfield Universal Fly Cutter in ONE operation on a horizontal or vertical mill or drill press. Individually adjustable bit holders permit slots of any shape to be cut 3/16" to 1-1/2" wide.



Above: FACE MILLING

STANDARD BITS MAKE 4 TO 6 DIFFERENT CUTS IN 1 OPERATION!

For many types of milling, light metals and plastics as well as steel, there is no longer need for special cutters. A single Newfield Universal Fly Cutter, utilizing any type of standard high speed steel or carbide bits, makes multiple cuts in one operation. In contrast with expensive specially ground cutters, the standard bits used in the Newfield are easily and quickly ground in your own shop, readily replaced or reground for other work, at small cost. There is practically no down-time if a bit is broken.

The Newfield fits all standard arbors, turns to any required speed for fly cutting, slotting, surface and straddle milling, gear cutting, disc and gasket cutting. Standard sizes are 4", 6", 8", 10". Write for details of this versatile, production-upping, money-saving tool.

NEWFIELD MACHINED PARTS COMPANY

7160 Melrose Avenue, Los Angeles 46, California

PHOTOELECTRIC EQUIPMENT

New uses for photoelectric cells are continually being developed. Yet there are many plants where mechanics have not come into any definite contact with these devices, and know little or nothing of their possibilities.

A considerable number of firms are now able to provide photo-electric apparatus, and notable among these, of course, are the larger electrical companies. The cells are light-sensitive, and in many cases are made to operate thru the interception of a light beam that is normally kept trained on the cell.

One firm which produced a pilot control relay, however, arranged it so that a change in light intensity of 10 foot-candles would suffice for positive operation of the photoelectric tube. This tube was connected to amplifier tubes and a relay thru a flexible connecting cord. By the adjustment of a condenser, the device could be made to operate at various values of light intensity. The light source embodies a plano-convex lens, and a socket to receive an automobile lamp bulb. Used on regular electric power lines, this light source requires a step-down transformer.

Some firms can supply complete and ready-to-use light relay and light source units, making the relays in both a-c and d-c models. One line of units, is designed so that the tubes and

other components are held within an aluminum housing. There is a window in this housing, thru which the beam from the light source shines on the light-sensitive element.

These have been largely used for the control of electrical circuits, and when they are provided with vacuum controls, the relays can control circuits carrying up to 1320 watts. Light source units go with these relays can be had in both a-c and d-c models also, and these contain focusing optical systems. They, too, can be housed in aluminum cases if that is desired.

CROZIER TOOL POST TURRET

An improvement in tool post turret design is announced by the Crozier Machine Tool Co., successors to the C-W-C Corp'n, Prairie at 118 St., Hawthorne, Cal.

The Turret, is now specially adapted for cutting-off operations. One side of block is channeled to receive a standard beveled section cut-off blade, supported at top by a hardened channeled bar, which provides maximum bearing surface for locking bolts, thus quickly and positively centering and holding blade in correct vertical position. There is no overhang of holder, and only sufficient tool extends to the required depth of cut.

No additional charge is made for the improved design, and the special holder and a high speed steel standard beveled section cut-off blade are included in the present price of the Turret. The turret retains its normal advantages of fast, close indexing, accuracy and long life. It is available for small, medium and large lathes.

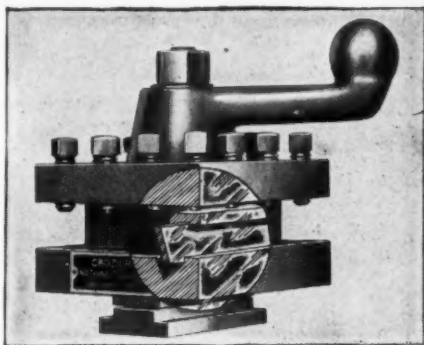
LOW-PRESSURE HYDRAULIC VALVES

Because the use of $\frac{3}{4}$ " hydraulic piping is being constantly expanded in many manufacturing plants, a need has developed for $\frac{3}{4}$ " 3- and 4-way operating valves for low pressure hydraulic service. True, there have been a number of valves on the market which have been adapted to this service, but it is claimed that none of them possess all of the features desired. The new Nopak $\frac{3}{4}$ " hand operated hydraulic valve was developed specifically for dependable leakproof service on $\frac{3}{4}$ " hydraulic lines at pressures up to 300 psi.

This valve embodies all of the well-known Nopak features such as patented cored disc, precision hand-lapped surfaces of disc and seat, line pressure-sealing and finger-touch control. In addition it incorporates a stuffing box with gland nut in the valve-stem assembly.

This feature has been added to prevent bothersome, messy seepage of hydraulic fluid at the valve stem, a condition which frequently develops unless preventive measures are taken. Such valve stem seepage is usually the focal point of most valve troubles. This special construction is also provided in Nopak of other sizes for use on low pressure hydraulic lines.

The new $\frac{3}{4}$ " Valve is made in all-bronze construction, with lubricating channels in



disc and seat, for water-hydraulic service, and in semi-steel, without lubricating channels, for oil-hydraulic service. Nopak Control Valves in hand, foot and solenoid models, in a complete range of sizes are products of Galland-Henning Mfg. Co., 2754 S. 31 St., Milwaukee 7, Wis.

Into Abart Speed Reducers go

- Heat-treated nickel chromium steel
- Nickel molybdenum steel
- High grade gear bronze
- Full ball or roller bearings
- Dust-proof, oil-tight housings



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ABART GEAR AND MACHINE CO.
4832 W. 16th St., Chicago 50, Ill.

TWO SPINDLE *Adjustable* DRILL HEADS

Drill Two Holes At Once



✓ Adjustable Centers
from $\frac{1}{2}$ " to 6"

✓ Drill Capacity 0 to $\frac{5}{8}$ "

Sleeve and overarm types . . . in several sizes. Will double output of any single spindle drill press.

Quickly adjusted to desired drill centers from $\frac{1}{2}$ " to 6".

Send for bulletin.

LINDERME MACHINE & TOOL CO., INC.

12253 Coyle Ave., Detroit 27, Mich.

MOTORS

Various mechanical features of motors and motor auxiliaries, as developed in recent years, have done much to solve problems of power transmission that were formerly rather difficult.

In the case of endless belts running from a motor to a driven unit, belt tension is a problem in many plants, due to different conditions of humidity and other factors.

Adjustable motor bases have been in use for a considerable length of time. The coming of the variable-speed pulley drive, of the type involving only one

variable-pitch pulley, has also extended the need for readily - adjustable motor bases, that will allow the distance between pulley centers to be changed quickly.

There is one motor base which rides on ball bearings, and adjustment is made by means of a handwheel. An indicator dial is provided on the base, which accurately tells just what the belt tension is at all times. The base can be fitted with an attachment, if desired, by means of which it and a variable-pitch pulley can be adjusted simultaneously. All adjustments are made while the motor is running.

Variable speeds are often obtained from motors, however, without the use of variable-pitch pulleys. At least one company has provided an a-c motor with a special controller for variable speeds. The controller consists of two-single-phase induction-type voltage regulators, with both

rotors mounted on a common shaft, and placed within one frame. It is possible, with this setup, to obtain any desired speed, from a point almost at zero to a maximum of around 1,800 rpm. Sizes of such equipment varies between one and 7½ hp.

Motors with reducing gears directly applied are now being made by many manufacturers. Such simplify power drives greatly, as compared to the use of separate speed reducing setups in various cases. Helical type gears are often used when the power take-off shaft is parallel with the regular motor shaft.

They're Going Overboard For Victory—Are YOU?



**USE 8-POINT PLAN FOR
AN OVERBOARD DRIVE
IN THE 6TH WAR LOAN!**

NOV. 20th to DEC. 16th

Your plant-wide selling of the 6th can do much to lessen the price our fighting men so willingly pay for victory! Join the coast to coast parade of patriotic firms now assuring an "overboard" showing in the 6th by following the 8-Point Plan.

- Appoint a 6th War Loan Bond Committee, representing labor, management and other groups.
- Select a Team Captain—preferably a returned veteran—for every 10 workers.
- Establish a Quota for each department—and every employee.
- Arrange Meetings of Captains, highlighting importance of their work—effective sales method—and need for detailed study of Treasury Booklet, Getting the Order.
- Make Assignments to those best equipped to arrange music, speeches, rallies, competitive progress boards and meeting schedules.
- Issue Individual Pledge Cards in name of each worker, providing for cash or installment purchase.
- Resolicit! Your State Payroll Chairman has a special Resolicitation Plan for you to put into action near the end of the campaign.
- Give generously of your Advertising Space to drive home the War Bond story.

The Treasury Department acknowledges with appreciation the publication of this message by

HITCHCOCK PUBLISHING COMPANY

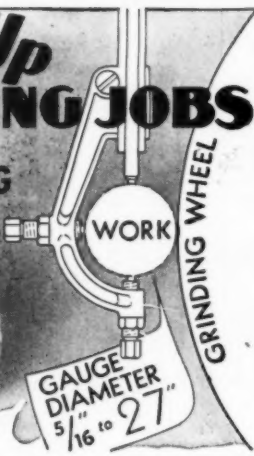
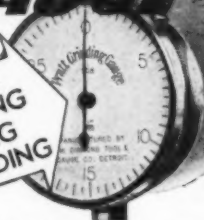
This is an official U. S. Treasury advertisement—prepared under auspices of Treasury Department and War Advertising Council



Speed Up GRINDING JOBS

With Automatic
DIAMETER INSPECTING
GAUGE

VISUAL
READING
DURING
GRINDING



Pratt Grinding Gauges caliper external cylindrical jobs while work is in motion or at rest. Adapted to straight or tapered work. Tolerances of .0001" plus or minus easily maintained. Visible check on out of roundness, rough grinding and chatter. Cannot grind work undersize unknowingly. Easily installed on any grinder. Pratt Grinding Gauges increase production, eliminate scrap and assure accuracy. A modern precision tool, ruggedly built.

American

DIAMOND TOOL & GAUGE CO.

15920 WOODINGHAM • DETROIT 21, MICH.

Send for Bulletin

HANDLING SHEET STEEL

In those occasional instances where sheet steel must be handled by hand, some plants have found it advantageous to provide their men with special rawhide or leather gloves, reinforced with ribbons of steel woven into place. Such are obtainable from firms making a specialty of various types of industrial gloves.

However, it is generally the case, where sheet steel is handled in large amounts, that special mechanical methods are used for the purpose. Special sheet lifters or grabs are employed which handle sheet

steel in packs, rather than in single sheets, holding a pack of steel horizontally while it is being lifted and transported. Some firms provide sheet steel grabs or lifters for this purpose, in capacities all the way from two to 60 tons, in either hand-operated or motor-operated models.

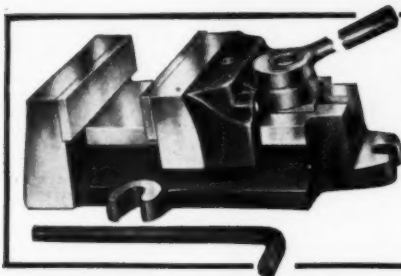
These grabs or sheet lifters may be applied to a hoist carried on various kinds of overhead materials handling equipment. One efficient layout noted for the handling of sheet steel, combined a lifter of this kind with an under-running single-beam bridge crane. Such a layout is especially convenient for moving packs of sheet steel into and out of storage.

There are some cases, however, where it is more convenient to have sheet and plate handling devices for use with cranes or parallel-duty devices, which will lift while they are in vertical position.

This really requires a lifting clamp. Some of these are available that will lift any such material from thin sheets to armor plate. Standard sizes have weight capacities from ½ to 10 tons, but clamps that will lift up to 100 tons can be had on special order.

Shipyards are large users of such handling devices, but they are also found in various industrial plants.

Steel mills, just like other establishments, often have their space problems and resultant handling peculiarities. In one, sheet steel packs are received from conveyor end, discharge at right angles.



PLUNKET QUICK ACTION VISE for DRILL PRESS or MILLING MACHINE

Designed for production work, using an eccentric motion to apply pressure to jaws.

Eccentric motion moves jaw 5/16".

Size 6" jaws, 1 1/2" deep, opens 4" **Net Price \$38.50**

Pressure between jaws, with handle furnished, 2200 lbs. Net weight 36 lbs.

Our complete line includes Vises for Drill Presses, Milling Machines, Shapers, Grinders

WRITE FOR CATALOG

J. E. Plunket Machine Co. 1823 W. Lake St.
Chicago 12, Ill.

LYNN

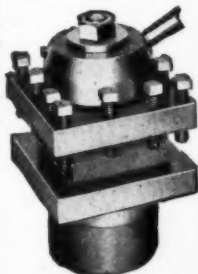
PRECISION SELF - INDEXING

TOOL POST TURRETS

For lathes from 9" to 30" swing. Both tee bolt and bolt circle mountings for all types of screw machine and turret base mountings. Perform 4 separate operations in succession with one setup. All working parts enclosed.

Sizes: 3 1/4",
4 1/2", 5 1/4",
6 1/2", 8".

Prompt Shipments. Write for information.



LYNN MANUFACTURING CO.

218 Elroy Street, Minneapolis 8, Minn.

KEO

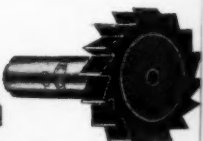
CUTTERS



Cutters of proven quality. Standard sizes in stock for immediate shipment. Special cutters made to blue print specifications.

Write today for prices.

Few territories open.



KEO CUTTERS

19326 Woodward - Detroit 3 Mich.

SCHMIDT SOLDERING and OPEN FLAME TORCHES

Use artificial or natural gas or gasoline. Start without generating—"soldering heat in less than a minute." Schmidt "CONCEALED FLAME" Soldering Torches hold coppers steadily at any desired heat for continuous work. Very economical.

A moderate investment in Schmidt Equipment will step up production, reduce costs and increase profits. Send for circular.

for all Soldering
Open Flame Work
Brazing
Branding
Laboratory
Use, etc.

**CONCEALED
FLAME
TORCH**



**OPEN
FLAME
TORCH**

MINN-KOTA FOUNDRY & MFG. CO.

Dept. 804

Fargo, North Dakota

**BROACH YOUR *Small Parts* AT A
NEW LOW COST with the**

Zagar "S.P."

**HYDRAULIC
BROACHING
MACHINE**



More and more work is going to be broached. Example: screw machine shops can eliminate much reaming trouble by broaching round holes. This hydraulic machine will handle *all* your small parts; 80% of ALL your parts. 20" maximum stroke; up to 6000-lb. pull; takes broaches



*Unskilled
labor catches
on in a hurry.*

up to 1 3/4" diameter, key type, threaded or grooved. Variable cutting speed; set rate—30 ft. p. m. Compact; only 36"x24"x42". Eye-opening, low-cost operation; ways hardened and ground; no chatter.

Get illustrated Bulletin "B"

ZAGAR TOOL INC., 23882 Lakeland Blvd., Cleveland 17, O.



***Zagar* COLLET
INDEXING HOLDING FIXTURES**

TAPS AND TAPPING

It is important that tool steel used for making of taps provide cutting edges that are both keen and durable. Good long-wearing steel that is available in bars, and that is non-deforming and oil-hardening, is the choice of many tap makers.

One such has a manganese content of around 1.50, and a carbon content about .90%. The bars come bearing a special red color, which makes them readily identifiable. This steel also has smaller amounts of silicon and molybdenum.

However, convictions of tap manufacturers, with specific regard to the best steel to use for the purpose, may vary considerably. It depends on their belief as

to whether non-deformation is more important than actual cutting qualities; whether actual cutting qualities should take precedence over toughness and breakage resistance, and their ideas as to the importance of various other interrelationships.

Certain it is that tap manufacturers provide both standard and special taps. While they may differ slightly on some minor considerations, most of those who advertise their taps consistently have high quality products that are fully dependable.

Many shops that do not have sufficient tapping to justify installation of regular tapping machines, do keep tapping attachments on hand.

Modern attachments of this kind usually engage and reverse automatically. One attachment has a chuck with a floating jaw. It centers the tap

when it is pressed all the way up and tightened with a wrench. It has a clutch drive, which requires simply following the lead of the tap itself, no pressure being necessary.

Tapping attachments that are provided with leather clutches are sometimes used and they have a highly sensitive action that is much to be desired. Such may be had in a number of different sizes, carrying taps all the way from No. 1 up to 1" size. They are provided with quill clamps for all modern drill presses. Strategy dictates keeping the largest tapping attachments at the larger drill presses in the shop, where power is ample.

★ THE ★ WONDER CUTTER

The lowest-priced wire and rod cutter on the market. The hardened cutters last indefinitely.

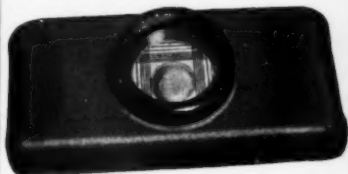
Hand operated. A giant for work, cuts wire and rods up to $\frac{1}{2}$ -in. round or $\frac{3}{8}$ -in. square and band iron up to $\frac{1}{2}$ in. by 2-in. Adjustable stop for repeated cuts to same length. Large or small, your shop can use a WONDER CUTTER.

*Write today for
prices and trial offer.*

The Federal Foundry & Supply Co.
4602 East 71st St., Cleveland, Ohio



FELL PRECISION LEVEL



A precision "all-way" level for use in machine tool building, setting up and maintenance, whether for establishment of level working surfaces or for the accurate checking of straightness where true level itself is not required.

Graduations are in .0005" per foot and form squares about a circular bubble, thus giving coordinate readings and showing the direction and amount of slope, if any. Made in two sizes— $5\frac{1}{2} \times 12$; $3\frac{1}{2} \times 6$.

*Write TODAY for
bulletin giving full details.*

Wm. B. FELL COMPANY
700 South St. Rockford, Ill.



Headquarters for Standardized Die Sets, embodying many exclusive features and embracing more than 195,000 stock sizes and 46 different styles. A die set that is unsurpassed. Let us prove it!

Send for our new 336 Page Catalog.

E. A. BAUMBACH MFG. CO.
1810 So. Kilbourne Ave., CHICAGO, ILL.

WHEN EVERY SECOND COUNTS

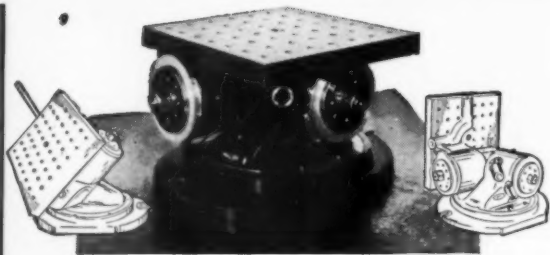
"THE TOOLMAKERS
BEST FRIEND"



This small tool stand job was saved on the Grob Open End Band Saw in record time. Die illustrated with four openings completed in 125½ minutes including change over from opening 16 opening.

Write for our catalog full of hints on saving many precious minutes and hours with the help of Grob's exclusive prototype of Band Saw set-up.

GROB BROTHERS
GRAFTON, WISCONSIN



Studler Universal Compound Angle Plate

Saves about 30% of time formerly consumed in set up of work. Can be used on milling machine, shaper, planer, jig borer, drill press, etc., to lay out, machine, and check work without removing work from plate. Can also be used as a 90° angle plate on the machine or on the bench.

The Studler Universal Compound Angle Plate holds work in any position from 0° to 90° in two planes 90° apart and in any position within 360° of the radial axis as the surface plate, from a parallel position to the base, may be tilted 90° in two directions and also rotated 360° on the base.

Calibration is accomplished thru use of two 5" and one 10" protractor, each graduated in half degrees, each with a vernier graduated to 1 minute and having an accuracy within 10 seconds of the arc. Each plane has its own locking unit so that the 11"x12"x1 1/4" surface plate may be moved in any plane, leaving the other two planes securely locked in place. Write for Bulletin No. 4.

THE ANGLE COMPUTER CO.

3722-20 Melrose Avenue • Los Angeles 38, California

STUDLER ANGLE COMPUTER

UPRIGHT DRILLS

Whether the upright drills in a shop are chiefly of automatic type, or of the ordinary drill press variety, they are a very important part of the machine layout. Not all plants have selected their upright drills intelligently. The work in one factory is so different from that in another, that all possible care should be exercised to obtain drills that fit the duty they are to perform, to the highest possible degree.

Often, a single manufacturer of upright drilling machines builds a considerable number of models. One has been particularly careful with regard to the design of

his controls, which are placed on all machines in such manner that minimum effort is required to operate them. Bench models of the tubular column variety are included in the line.

One builder of radial drills, also produces upright machines, in which the spindles and feed changes are all controlled by single levers, thru sliding gears.

They have positive types of clutches for engaging the feeds, and are provided with automatic lubrication thruout. There are adjustable feed trips, and in addition, safety trips at both top and bottom of spindle travel. These machines are about as fully foolproof, it is believed, as powerful upright drills can be made.

Bench drills of the tubular column type are made by manufacturers of light duty machines, and have found an indispensable large

place in countless factories. In some places, where nearly all work done is light, drills of this kind practically dominate the setups.

In other places, they are considered more as standby or auxiliary equipment, to handle the light work, thus leaving the heavier uprights free to operate on heavier jobs only.

The main head castings on some of these drills, carrying the drill spindle in front and the driving motor on the back, are of high quality close-grained gray iron. The quills are 2" in diameter, and precision machined. An angle drilling attachment is made for bench drills.



The Standard of QUALITY

All standard sizes carried in stock for immediate delivery. Special cutters made to Blue Print.

As Cutter Specialists since 1919 we are able to offer the highest *quality* and *service* at *attractive prices*.

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Market St., Waukegan, Illinois

RECLINABLE POWER PRESSES

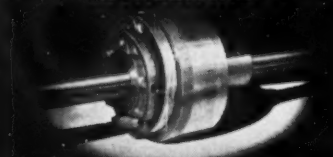


We manufacture a complete line of mechanical power presses, with sizes and types for every need in your shop.

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bulletins.

ZEH & HAHNEMANN CO.
Newark, (5) New Jersey

★ ★ THE HILLIARD ★ ★



SINGLE REVOLUTION *Clutch*

Wherever extremely accurate control of intermittent machine operation is essential the Hilliard Single Revolution Clutch is unequalled. Its accuracy has won for it the acceptance of industry for cutting, punching and packaging operations.

★ **WRITE TO DAY!**

For information that will help you to adapt this clutch to your needs.

THE HILLIARD Corporation
126 WEST 4TH ST. ELMIRA, N. Y.

★ OVER RUNNING SLIP CENTRIFUGAL FRICTION ★



Now . . . **A Heavy-duty Bench-type Engraving and Marking Machine . . . The PANTO Model UE-3**

- HEAVIER CUTTING SPINDLE
- FOUR SPINDLE SPEEDS
- MORE PANTOGRAPH REDUCTIONS
- FORMING GUIDE ATTACHMENT

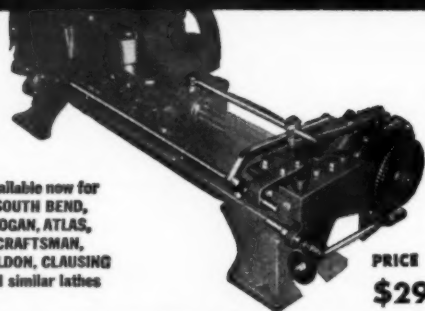
Plus the exclusive Panto feature . . . Interchangeable heads for engraving, electrical marking, and acid etching.

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H. P. PREIS ENGRAVING MACH. CO.
157A SUMMIT ST., NEWARK 4, N. J.

Newton AUTOMAT

Available now for
SOUTH BEND,
LOGAN, ATLAS,
CRAFTSMAN,
SHELDON, CLAUSING
and similar lathes



PRICE
\$295

CONVERTS HAND-OPERATED TURRET LATHES INTO RELIABLE AUTOMATICS

• HERE is relief from manpower shortage and losses from rejects incurred by operator inexperience and fatigue—a practical, highly efficient means of greatly increasing output and profits, easily installed on any bench lathe. The unit is very simple in design and of rugged, enduring construction—as foolproof as a mechanical device can be. The set of standard cams will handle almost any job. The member which actuates the cross slide is a torque rod which cushions the shock of forming and cut-off operations, assures uniform feed and accurate repeating, prolongs tool life. An automatic cut-out, quickly adjustable to work of different character, reduces tool spoilage and parts rejection. A Schrader-engineered 3-way valve operates any collet closer. Put this easily installed, money-making unit to work for you now. It will pay its cost in less than 30 days!

NEWTON MANUFACTURING COMPANY

706 North Heliotrape Drive • Los Angeles 27, California

"VICTORY" LOANS

Most war contractors are ignoring the benefits of "V", "VT" and "T" loans and thereby jeopardizing themselves and the nation's economy, according to Mark A. Brown, Vice President of Chicago's Harris Savings & Trust Bank.

Surveys have shown, Mr. Brown states, that war contractors generally have failed to provide themselves with the interim financing necessary to reconvert to peacetime production, and by such negligence are contributing to a dangerous postwar situation.

A New England survey disclosed that 72% of manufacturers had made no

plans to deal with terminations. Another survey was made by a prime contractor at the request of the Harris Trust & Savings Bank. Of the 100 first tier sub-contractors surveyed not one had applied for either a "VT" or "T" loan as a financial protection against termination.

Mr. Brown expects the larger contractors from his criticism, citing such concerns as General Motors, Bendix and Studebaker as among those who have insured themselves against financial difficulties arising out of termination by arranging for necessary loans, although they are in less need of such assistance than the smaller operators who have not done so yet will probably need such help.

The "T" loans were provided for in the Contract Settlement Act of 1944 and are to be administered thru the Office of Contract Settlement. Like

"V" and "VT" loans, Mr. Brown said, the "T" loans provide for a government guarantee. However, unlike the "V" and "VT" loans the "T" loans can be negotiated after termination.

In the case of a contractor having contracts with more than one government agency the "T" loan will be made thru the agency having the preponderance of contracts. In other words, a package deal.

This is somewhat different from "Advantage Partial Payments" discussed by Henry P. Isham, Chief of the Termination, Purchasing and Renegotiation Policy Unit of the Chicago Ordnance District, at the same meeting.

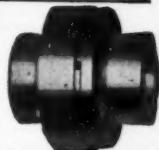
When you need Couplings, think of LOVEJOY!

L-R

L-R FLEXIBLE COUPLINGS

L-R "Resilient Alignment" couplings correct misalignment, take up shock and vibration, protect equipment. Non-Lubricated. Cushions always in sight. **NO SHUT-DOWNS FOR CHANGE.** Selector Charts with Catalog of couplings 1/6 to 2500 h.p. duties. Wire or write

LOVEJOY FLEXIBLE COUPLING CO.
5026 W. Lake St., Chicago 44, Ill.



New L-R Type "C" shrouded coupling. Added protection. Pat. and Pats. Pend.

ARTUS ARBOR SPACERS

The **COLOR** tells the **THICKNESS**



ARTUS Arbor Spacers made of plastic in various colors identify thickness at a glance! .001, .0015, .002, .003, .005, .0075, .010-.030. Speed up accurate fitting at low cost. Write for folder.

CONVENIENT TRIAL OFFER
Handy Spacer Assortment

10 ea. .001 — .0125 thick
5 ea. .015 — .030 thick

100 SPACERS IN ALL

3/8" — \$2.80 1 1/4" — \$3.40
1" — 3.00 1 1/2" — 4.20

Other standard sizes also available.

*Illustrated Folder Free.
Immediate Delivery on
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6 Broadway

New York 4, N. Y.

PRECISION MACHINE VISES



All Perkins Swivel Vises swing 360 degrees and have complete circle graduations

All Angle Vises raise 92 degrees

Write for Bulletin
No. 110

MILLER-KNUTH MFG. CO. OMAHA, NEB.

BENCH CENTERS



Removable Centers are tool steel, hardened and ground. Equipped with spring-type tail stock. Made in 6 inches diameter, 18 inches between centers.

MICHIGAN DRILL HEAD CO.

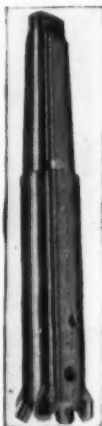
971 E. 8 MILE ROAD
HAZEL PARK, MICH.

FOUR-CUTTER TOOL

The bits of Four-Cutter tools made by The State Mfg. & Construction Co., Franklin, Ohio, are inserted at a 30-degree angle. The inner end of each bit impinges upon a finely threaded screw whereby the bit can be protruded for regrinding or for machining a hole of larger diameter. The bits are held securely in position by individual set-screws.

Built in a variety of standard sizes, with fluted or plain bodies, these tools range in cutting diameters from $\frac{3}{4}$ " to $4\frac{3}{4}$ ". The clusters of bits can be expanded in circumference $\frac{1}{8}$ " in the smallest model to $1\frac{1}{4}$ " in the largest for increasing the cutting diameters.

The company makes special models to meet customers' requirements. These incorporate duplex heads for cutting two or more diameters, pilots, collars, facing bits, wear strips, center oil holes, etc. The Four-Cutter principle lends itself to a wide diversity of specialization.



THE SAW CHIEF



A new multiple purpose tool known as the "Saw Chief" is offered by Chicago Precision Equipment Co., 919 N. Michigan Ave., Chicago, Ill.

In use, the Saw Chief attaches to electric and air drills or may be driven by a

flexible shaft. It converts the rotary operation of the drill into reciprocating action and the hack saw blade or file mounted in the holder reciprocates with a $\frac{1}{2}$ " stroke. It cuts all metals, every gauge—wood, plastics and other materials. It eliminates slow, tiresome hand sawing or filing operations, reaching into places that are difficult of access with ease.

The tool is readily portable, may be carried from job to job and is always ready for use. Quick deliveries are offered on AA5 priority or better.

MODERNAIR CHUCK

For handling parts in all operations requiring the chucking surface and operation to be concentric with each other, a new air chuck has been developed by Modern Products, Ltd., 952 So. Grand Ave., Los Angeles 15, Cal.



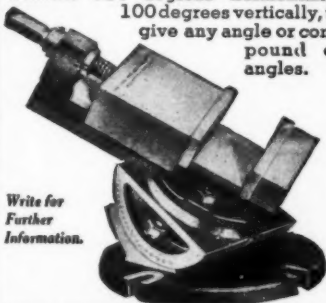
Thru use of inexpensive, easily changed adaptors, the Moderna Chuck No. 10 can utilize many types of standard shop collets. Model handles collets up to 1" diameter inclusive, with standard 5-C collet, and up to and including 1 $\frac{1}{2}$ " with adaptor for 2-J collet. Both hands of operators are freed as chuck operation is controlled by foot valve. Of sturdy construction, the 1" thickness of top casting section permits drilling and tapping holes $\frac{3}{4}$ " deep to obtain special jigs to check. Stop bracket under collet is removable so that long pieces can extend thru collet.

INDICATOR COMPARATOR CATALOG

A new 56-page catalog, No. 53 covers all Ames impersonal measuring instruments. It is rearranged in context for the convenience and ready reference of buyers, design engineers, and users of dial indicators and micrometers, comparators, cylinder gauges, and thickness measures. The catalog includes approved dimension data of American Gage Design Committee. Copy may be had from B. C. Ames Co., Waltham, Mass.

New Britain UNIVERSAL VISE THE ORIGINAL

Swivels 360 degrees horizontally,
100 degrees vertically, to
give any angle or com-
pound of
angles.

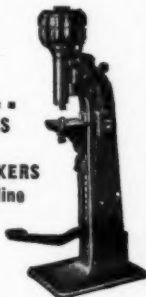


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Further
Information.

NEW BRITAIN TOOL & MFG. CO.
NEW BRITAIN, CONN., U. S. A.

GRANT RIVETERS...

PIONEERS
and
PACEMAKERS
in their line



—head rivets from smallest
to $\frac{1}{2}$ " diameter either by
NOISELESS SPINNING or
VIBRATING HAMMER
method—Sizes to meet all
needs—Types include Ver-
tical and Horizontal Multi-
ple Spindles.

Write for literature and
don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
C E Station, Bridgeport 5, Conn.

ARMSTRONG-BRAY STEELGRIP FLEXIBLE BELT LACING



STEELGRIP BELT LACING

A strong lacing for all
types of belts. Put on with
a hammer in a few minutes.
Clinches smoothly into
belt, compresses ends,
prevents fraying. 2-piece
hinged rocker pins pro-
vided. 8 sizes. In boxes,
handy packages, cartons
and long lengths.

Write for catalog sheets.

ARMSTRONG-BRAY & CO.
"The Belt Lacing People"
5364 Northwest Highway Chicago, U.S.A.

BELT LACING Both types from 1 source

BELT HOOKS come
with blue aligning cards
that prevent waste—every
hook can be used. Pro-
tects fingers. Applied
with a WIREGRIP or any
other standard Belt Lac-
ing Machine. 6 sizes.



NIELSEN Heavy Duty Live Centers

Write for
catalog on
live centers

Adapted
for heavy
duty work.
Precision type
ball and roller
bearings assure
maximum capac-
ity for high speed
production and long
service.



NIELSEN, INC. LAWTON,
MICH.

Mechanics Through the Ages



WHEN PARADING

THE CARPENTERS GUILD OF ANCIENT POMPEII CARRIED ALOFT A DISPLAY CONSISTING OF A MINIATURE BUILDING AND STATUETTES OF DÆDALUS, THEIR PATRON; OF ICARUS; AND OF SAWYERS AND PLANERS.

THE

DOUBLE
AUTOMATIC
SCREW MACHINE.

SPENCER DEvised IN THE 1870'S WAS SO "SELF-ACTING" THAT SPENCER FED LARGE COILS OF WIRE TO A BATTERY OF MACHINES, LOCKED THE FACTORY DOOR, RETURNING WHEN THE JOB WAS FINISHED TO FIND A SUPPLY OF PERFECTLY TURNED-OUT SCREWS.

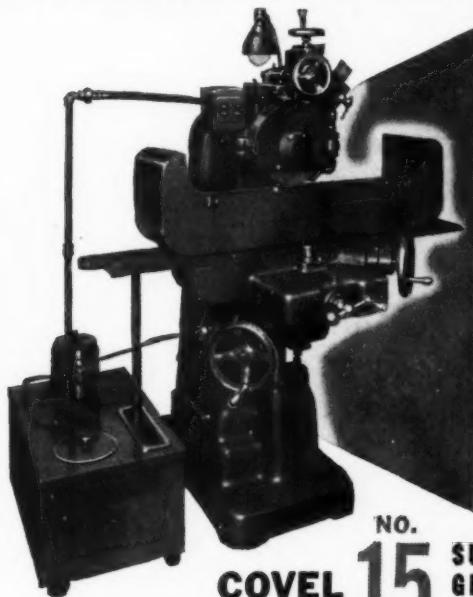


KEEP TWO

SKILLED WORKMEN FROM BEING SPIRITED AWAY TO RUSSIA, JAMES WATT RECALLED THEM TO SOHO FROM LONDON BEFORE THEY HAD SET UP AN ENGINE. BEFORE 1824, MECHANICS WERE FORBIDDEN TO LEAVE ENGLAND, BUT FOREIGN AGENTS FOUND WAYS TO SMUGGLE THEM OUT.

CUT WORK SPOILAGE!

Save Valuable Time and Material



NO. 15 SURFACE GRINDER (6" x 18")

Work spoilage in the finishing stages means a great loss of time, material, and manpower. Safeguard your products. Specify the Covel No. 15 Hand Feed Surface Grinder for precision finish jobs. The wheel on this famous machine can't drop into the work. The spindle remains stationary—it's the work that moves UP to the wheel! This feature alone makes

the No. 15 indispensable in busy war plants where many workmen have had little experience with grinding machines. Check the additional points above, all designed for efficient, trouble-free operation on fast production schedules.

WRITE TODAY FOR BULLETIN MT-124
AND FULL DETAILS.

PROMPT DELIVERY TO WAR INDUSTRIES



GRINDING MACHINERY SINCE 1874

COVEL INDUSTRIAL GRINDERS

COVEL MFG. CO., BENTON HARBOR, MICHIGAN U. S. A.

- ★ Ball Bearing Spindle—dust-protected.
- ★ 3-Speed V-Belt Drive.
- ★ V and Flat Table Ways.
- ★ Convenient Controls.
- ★ Extra-large Work Table.
- ★ Ample Knee-room for operator's comfort.
- ★ Built-in Wheel Truing Device (optional).
- ★ Wet Grinding Attachment (optional).

PROMPT DELIVERIES
HIGH SPEED END MILLS
DOUBLE END



Two and Four Flutes

Dia. of Mill	Diameter of Shank	Length of Flute	Overall Length	Net Price
1/8	3/8	3/8	3	2.20
5/32	3/8	3/8	3	2.20
3/16	3/8	1/2	3	2.20
7/32	3/8	5/8	3 1/8	2.20
1/4	3/8	5/8	3 1/8	2.20
9/32	3/8	3/4	3 1/8	2.20
5/16	3/8	3/4	3 1/8	2.20
11/32	3/8	3/4	3 1/4	2.20
3/8	3/8	3/4	3 1/4	2.20
7/16	1/2	1	4 1/4	2.80
1/2	1/2	1	4 1/4	2.80
5/8	5/8	1 3/8	5	3.44
3/4	3/4	1 5/8	5 5/8	4.20
1	1	1 3/4	6 1/4	5.40

SINGLE END
Two and Four Flutes

Dia. of Mill	Dia. of Shank	Length of Flutes	Overall Length	Net Price
1/8	3/8	3/8	2 5/16	1.40
3/16	3/8	1/2	2 3/8	1.40
1/4	3/8	5/8	2 1/2	1.40
5/16	3/8	3/4	2 1/2	1.40
3/8	3/8	3/4	2 1/2	1.40
7/16	1/2	1	2 1/16	1.76
1/2	1/2	1 1/4	3 1/4	1.88
5/8	5/8	1 5/8	3 3/4	2.40
3/4	3/4	1 5/8	3 3/4	2.52

LONG SINGLE
END MILLS

Four Fluted

Dia. of Mill	Dia. of Shank	Length of Flutes	Overall Length	Net Price
1/4	3/8	1 1/4	3 1/8	1.68
5/16	3/8	1 3/8	3 1/8	1.68
3/8	3/8	1 1/2	3 1/4	1.68
7/16	1/2	1 3/4	3 3/4	2.08
1/2	1/2	2	4	2.16
5/8	5/8	2 1/2	4 5/8	2.76
3/4	3/4	3	5 1/2	3.44

VICTOR MACHINERY EXCHANGE, INC.
251 Centre Street **New York, N. Y.**

PROMPT DELIVERIES NEW HIGH SPEED SIDE MILLING CUTTERS



Diameter Inches	Face Inches	Hole Inches	Our Net Price Each	Diameter Inches	Face Inches	Hole Inches	Our Net Price Each
2	$\frac{1}{16}$	$\frac{1}{2}$	\$ 2.65	5	$\frac{1}{16}$	1	\$10.00
2	$\frac{1}{4}$	$\frac{3}{8}$	2.77	5	$\frac{3}{8}$	1	10.00
2	$\frac{3}{8}$	$\frac{3}{8}$	3.02	5	$\frac{1}{8}$	1	10.00
2½	$\frac{1}{4}$	$\frac{3}{8}$	3.40	5	$\frac{1}{2}$	1	9.51
2½	$\frac{5}{16}$	$\frac{7}{8}$	3.59	5	$\frac{3}{8}$	1	10.52
2½	$\frac{3}{8}$	$\frac{7}{8}$	3.78	5	$\frac{3}{4}$	1	11.46
2½	$\frac{7}{8}$	$\frac{7}{8}$	4.15	5	$\frac{7}{8}$	1	13.42
2½	$\frac{3}{2}$	$\frac{7}{8}$	4.15	5	1	1	13.42
3	$\frac{1}{16}$	1	4.10	6	$\frac{1}{16}$	1	12.50
3	$\frac{1}{4}$	1	4.10	6	$\frac{1}{4}$	1	12.50
3	$\frac{5}{16}$	1	4.35	6	$\frac{5}{16}$	1	12.50
3	$\frac{3}{8}$	1	4.54	6	$\frac{3}{8}$	1	12.50
3	$\frac{7}{8}$	1	4.79	6	$\frac{7}{8}$	1	12.50
3	$\frac{1}{2}$	1	5.04	6	$\frac{1}{2}$	1	12.41
4	$\frac{1}{16}$	1	5.67	6	$\frac{3}{8}$	1	13.92
4	$\frac{1}{4}$	1	5.67	6	$\frac{3}{4}$	1 or 1¼	15.12
4	$\frac{5}{16}$	1	6.36	6	$\frac{7}{8}$	1 or 1¼	17.89
4	$\frac{3}{8}$	1	6.36	6	1	1 or 1¼	17.89
4	$\frac{7}{8}$	1	7.12	7	$\frac{1}{2}$	1 or 1¼	18.00
4	$\frac{1}{2}$	1	7.12	7	$\frac{3}{8}$	1 or 1¼	18.00
4	$\frac{9}{16}$	1	7.75	7	$\frac{3}{4}$	1 or 1¼	21.67
4	$\frac{3}{8}$	1	7.75	7	1	1 or 1¼	25.39
4	$\frac{3}{4}$	1	8.38	8	$\frac{1}{2}$	1 or 1¼	25.00
4	$\frac{7}{8}$	1	10.00	8	$\frac{3}{8}$	1 or 1¼	25.00
5	$\frac{1}{16}$	1	10.00	8	$\frac{3}{4}$	1 or 1¼	28.00
5	$\frac{1}{4}$	1	10.00	8	1	1 or 1¼	33.64

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251 CENTRE STREET **NEW YORK, N. Y.**

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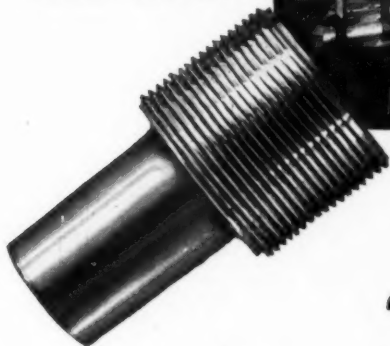
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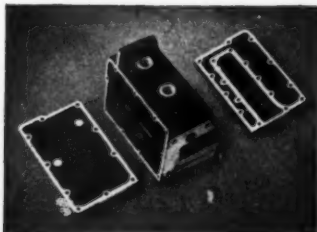


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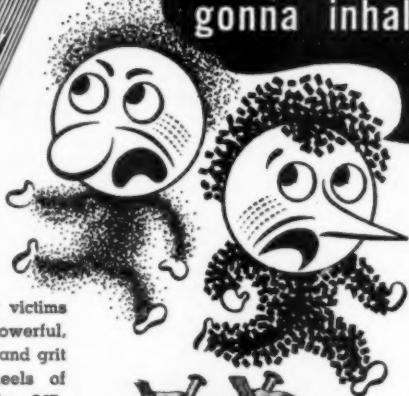


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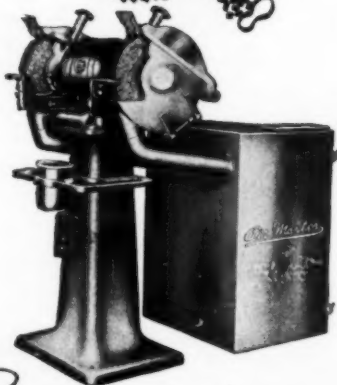


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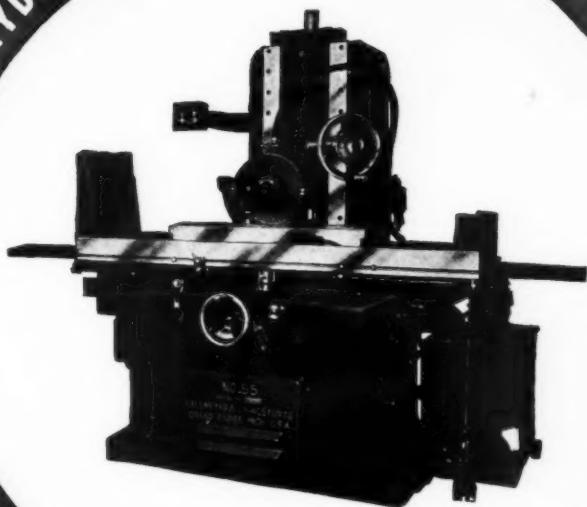
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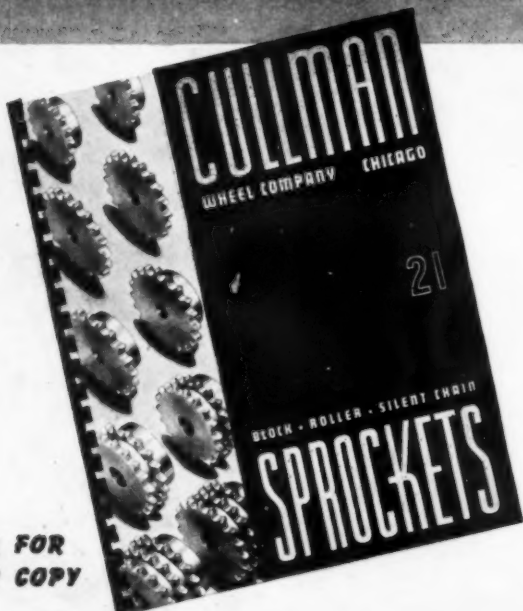
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